The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Acknowledgments

A WORD of acknowledgment is due to the many friends who have been good enough to express appreciation of our special numbers. The collection from time to time of original contributions on particular subjects obviously serves a useful purpose, and the requests for numbers published months ago indicates that their value continues long after the date of publication. Although a specially large edition was printed of last week's issue, relating to "Agricultural Chemistry and Fertilisers," it is already practically exhausted, and unfortunately requests for reprints of some of the articles were only received after the type had been distributed. This is the best evidence that the original work of British investigators is appreciated, and few things have given us more satisfaction than to provide original writers with a medium in which they can freely express and exchange their views. One of our readers writes: "What I appreciate in THE CHEMICAL AGE is its freshness, originality, and live interest in what is happening. We get in your columns matter which can be obtained nowhere else, and your special issues are quite a new feature in the current chemical literature of this country. In my recollection nothing resembling your Annual Review Number has ever before been published in connexion with British chemical industry, and such a production is one which all engaged in it may feel proud of and which is bound to help its reputation in the Colonies and other countries." Too generous as this, perhaps, is it is none the less gratifying, and an incitement to make the paper more and more serviceable to readers of all classes as time goes on.

Sulphur Recovery from Waste Gases

SOME few days ago a Canadian chemical engineer was discussing with us the available means for recovering sulphur (not sulphuric acid) from the waste gases of smelter plants. He pointed to the successful conversion in America of waste sulphur dioxide into sulphuric acid, particularly in those districts where the demand for acid was heavy and consistent. It was his contention, however, that in many instances it would be profitable to recover sulphur, whereas the prospects for recovered sulphuric acid would be, to say the least of it, doubtful; and he was anxious to obtain information of any such plants which might be in operation in this country.

We are reminded at the moment of a process of considerable technical interest which attracted attention a few years ago in America. This process is operated on the Thiogen principle, whereby the gas is reduced by means of a hydrocarbon, free sulphur, carbon monoxide and water, resulting in a typical reaction. In practice a number of difficulties surround the process, but success seems to have been attained by carrying out the reaction in an indirect way. The sulphur dioxide is first absorbed by means of a basic sulphide, such as calcium sulphide in the wet or dry state, the reaction resulting in the formation of calcium sulphite and free sulphur. Subsequently the sulphite is reduced with the aid of a hydrocarbon. This reaction results in the regeneration of calcium sulphide, which may again be employed for absorption of the sulphur dioxide. It is this last reduction process which has proved something of a stumbling-block, but it has been stated by S. W. Young that a method has been devised whereby the reaction takes place readily even at relatively low temperatures. Incidentally considerable progress has been made towards adapting the process to the recovery of flue dust.

Another reaction which is made use of to some extent depends upon the fact that when sulphur dioxide is passed over heated sulphide ore the sulphide is oxidised, so that ferric oxide and free sulphur remain. While in the laboratory the reactions

described above have been found to be rapid, especially when iron salts are present in the catalyser, difficulties have arisen in practice from the presence of free oxygen in the gases bringing about a serious waste of the hydrocarbon employed, while the whole of the available energy of the hydrocarbon is not utilised since carbon monoxide is in the main formed. It has been said that the most serious difficulty from the engineering point of view is the necessity, if the gases contain free oxygen, for the removal of the latter, otherwise the hydrocarbon will not displace the oxygen in the sulphur dioxide. In the Thiogen process the hydrocarbon is supplied by a spray of oil, the vaporised oil and waste gases entering a combustion chamber where the temperature is about 800°C., and then passing to a contact chamber packed with a mixture of plaster of Paris and sawdust wetted with water, to which a small quantity of iron salts has been added. Beyond the contact chamber is a condensing chamber for the collection of the free sulphur. In speaking of sulphur dioxide recovery processes one writer has said that the whole question is a deeply involved problem in economics which requires very careful consideration before any process, even if it is a technical success, is put into operation on a commercial scale.

The Merchant Trader

MR. CHARLES PAGE, in an interesting statement of his views on the chemical trade (which appears on p. 134), touches on the developments in chemical trading methods which have occurred within the past forty years, from the old system of exporting goods on consignment for sale to the formation of great combines with their own selling agents throughout the world. The latter are, in theory at least, self-contained communities which control all the processes, from the production of raw materials to the distribution of the finished product to the consumer, but even these occasionally are glad to make use of merchant houses and, indeed, include some of them among their recognised agents. If, however, the trust system makes the trusts themselves independent of the merchant, it makes the individual manufacturer or the small company more than ever dependent on him. The result is that the individual manufacturer of to-day, instead of waiting for the broker to bring him orders, entrusts the sale of the goods to a merchant who makes a speciality of selling them, and whose widespread organization keeps production and consumption in the closest touch and sympathy with each other. Thus, as Mr. Page points out, the latest development in the method of selling gives the individual manufacturer the benefits of the selling organizations of the big combines, while he retains the superior efficiency and economy of individual management of production.

Another very important, though comparatively recent, development is direct intervention in business by the Government and Government departments. Mr. Page is many degrees more moderate in his criticism of this policy than the majority of his merchant colleagues, recognising that such intervention, under the conditions prevailing in Europe at present, may be beneficial to the chemical manufacturer at home. Where there is an assured benefit to the home manufacturer to enable him to maintain his works, most merchants would probably be quite ready to make concessions, but what they bitterly complain of is the continual uncertainty in which the recent restrictions leave them. This, in Mr. Page's words, is having a paralysing effect on trade. He desires to see the system of permits and licenses abolished, and—if a tax is necessary to the existence of home industries—to know precisely what articles are dutiable and the amount of the duty. Then, at least, the merchant would know where he stands, and his commonest complaint is that he hardly knows from day to day the conditions he has to comply with.

Taxation and Unemployment

THE appeal which Mr. Ernest Benn made a fortnight ago in THE CHEMICAL AGE and other publications of Benn Brothers, Ltd., to business men on the subject of taxation and unemployment has been widely responded to. The suggestion was made that a substantial reduction in taxation would liberate a large capital sum to be invested in business instead of going into the Exchequer, and would thus enable employers to absorb a large percentage of the unemployed class. In some cases firms of employers express their general approval of the idea; in others a definite estimate is given of the number of additional employees a reduction of taxation would enable them to engage. Among the former class the chemical firm of John Nicholson & Sons, Ltd., of Hunslet, write:

> We are greatly interested in the article which you publish in the issue of THE CHEMICAL AGE, dated January 21, 1922. It seems to us that the lines on which you propose to work should be very advantageous to the cause of reduced taxation, and quite a departure from the usual practice of merely bemoaning the effect on industry of the existing taxation. We hope you will have a good response from other manufacturers and we shall be very pleased to supply the information which you propose to collect.

Of the latter class a communication from Marsh, Jones & Cribb, Ltd., of Leeds, is a good example. This firm, who are members of the Yorkshire Employers' Federation of Furnishing and Allied Trades, estimate that, if the reduction of taxation suggested by Mr. Benn were effected, they would be able to take on no fewer than 324 additional hands—which, large as it may seem, is described as "a conservative estimate." This is a case in which, if employers would join in putting concrete figures before the Government, substantial relief from the present burdens might be obtained, with a corresponding gain to industry and to the large number of people at present unemployed.

The U.S.A. Coal Crisis

THE recent coal strike is so fresh in our memories, and its effects upon industry so palpable, that we may regard with a sympathetic interest the grave news which reaches us from the United States as to the coal situation there. From a well-informed and confidential source we learn that "there is a likelihood that the coal industry next April will become the seat of the greatest labour disturbance that has occurred for many years." The wage agreements in the anthracite and bituminous fields expire, for the first time, simultaneously on March 31, and it is feared that the United Mine Workers will make it the occasion of a supreme effort. Two-thirds of the miners of the United States belong to the union, which represents also two-thirds of the productive capacity of the

mines. In the event of a strike it is estimated that the non-union mines, principally in Alabama and West Virginia, will be able to produce about four million tons of coal per week. With the present low consumption of about eight million tons per week and with fairly large supplies in hand, this non-union production is expected to enable the country to carry on. The chief fear is that the railway brotherhoods will join in the movement, in which case the non-union districts will be held up and the country be deprived of fuel supplies.

Already there is much unemployment in the United States, and a coal stoppage on so large a scale would greatly accentuate it, and incidentally teach the workers, if not their leaders, that the deliberate arrest and destruction of industry penalises themselves in the end more than any other class. That lesson, costly as it was, is one of the compensations of the strike in this country. The situation is regarded seriously in the United States, and gas companies and other concerns using coal in quantities are being strongly urged to lay in the largest possible stocks to meet the threatened emergency.

British Chemical Plant

THE publication of the official directory of members for 1922 of the British Chemical Plant Manufacturers' Association is a reminder of the steady progress and extension of chemical organisation undertaken by the Association of British Chemical Manufacturers. The directory provides a complete list of members, with their addresses, &c., together with a classified list of products and manufactures, and the firms who specialise in them. In an introductory note, Mr. J. H. Rawson, the chairman of the Association, reminds us of the principal objects of the Association—to foster the manufacture of British chemical plant, to promote closer co-operation between British chemical plant manufacturers and the interchange of information amongst its members, and to co-operate with the A. B. C. M. in order that British chemicals shall be made with British plant. The Association, he points out, consists of *bona fide* manufacturers. It is not itself a trading concern and makes no profit on any business transacted by its members. It does not interfere in any way with the business arrangements of its members or discourage their dealing direct or through merchants or other established channels. The object of the directory is to place before chemical manufacturers and other users of chemical plant the various products manufactured by the members, and where purchasers have any difficulty in obtaining a particular article they are requested to communicate with the Association, which will at once place the inquiry before all members likely to be in a position to execute the order. Further, the Association is prepared to advise on all matters relating to chemical plant, and assures inquirers of the best expert and manufacturing opinion. It is by sound and steady organisation of this character that the future of British chemical industries can best—indeed, can only—be assured, and where British firms seriously address themselves to the task they rarely fail to equal the best of their foreign competitors. At a time when there is a dangerous disposition to rely on adventitious aids, this policy of self-help and self-dependence is a hopeful sign.

Points from Our News Pages

In the "Leaders of Chemical Industry" series, Mr. Charles Page gives an interesting statement of his views on the prospects of chemical trade, developments in merchant trading methods, Government control of trade, and the exchanges problem (p. 134).

The last of Dr. Stephen Miall's articles on recent chemical theories deals with Langmuir's Octet Theory (p. 136).

Particulars are given of the exhibits in the Chemical Section of the forthcoming British Industries Fair, London (p. 138).

Letters are published from Mr. A. Chaston Chapman, Mr. R. Marsh ("Neutral Sulphate of Ammonia"), Professor J. W. Hinchley ("Institution of Chemical Engineers"), and "Tenebo" ("Experience at a Discount") (p. 135).

Reports are published of meetings of the Birmingham Newcastle-on-Tyne, and Nottingham sections of the Society of Chemical Industry (p. 140).

The subject of "Potential Developments in Refrigeration" is discussed by Dr. R. W. Ormandy and Mr. E. C. Craven (p. 139).

Our London Market Report records a decided improvement in the demand for many chemicals and a more favourable general outlook (p. 147).

Our Scottish Market Report states that the long-hoped-for improvement in trade is developing very slowly. Sales in the latter part of January were good in numbers, but the volume of business left much to be desired (p. 149).

Books Received

STATISTICAL ABSTRACT OF THE UNITED STATES, 1920. Washington: U.S.A. Government Printing Office. Pp. 874. 50 cents. net.

SOAPS AND PROTEINS. By Martin H. Fischer. New York: John Wiley & Sons, Inc.; London: Chapman & Hall, Ltd. Pp. 272. 24s. net.

BORAX AND BORIC ACID IN LEATHER MANUFACTURE. Borax Consolidated, Ltd. Pp. 78.

THE FAILURE OF METALS UNDER INTERNAL AND PROLONGED STRESS. Edited by F. S. Spiers. London: The Faraday Society. Pp. 215. 10s. 6d. net.

OFFICIAL DIRECTORY OF THE BRITISH CHEMICAL PLANT MANUFACTURERS' ASSOCIATION, 1922. 5s.

COAL AND SMOKE. By J. W. Cobb. London: Longmans, Green & Co. Pp. 23. 1s. post free.

ORGANIC CHEMISTRY. By V. von Richter. Translated by E. Fournier d'Albe. London: Kegan Paul, Trench, Trubner, & Co. Pp. 760. 35s. net.

The Calendar

Feb. 6	Society of Chemical Industry: "Recent Work on Catalysis at Solid Surfaces." E. F. Armstrong and T. P. Hilditch. 8 p.m.	Burlington House, Piccadilly, London.
7	Hull Chemical and Engineering Society: "The Theories of Catalytic Agency." W. C. Batty. 7.30 p.m.	Wilberforce Café, Hull.
9	The Optical Society: Annual General Meeting. Papers by F. W. Preston, A. J. Dalladay, Lieut.-Col. J. W. Gifford and F. Twyman.	Imperial College of Science, S. Kensington.
9	Chemical Society. "Artificial Disintegration of the Elements." Sir Ernest Rutherford. 8 p.m.	Institute of Mechanical Engineers, Storey's Gate, S.W. 1.
10	Society of Dyers and Colourists, Huddersfield Section: "Suggestions towards a Research Policy." Dr. W. H. Hodgson.	Huddersfield.
11	The Mining Institute of Scotland: General Meeting.	Edinburgh.
27	British Industries Fair.	London and Birmingham.

Leaders of Chemical Industry

II.—Mr. Charles Page

MR. CHARLES PAGE, the head of the well-known firm of Chas. Page & Co., Ltd., requires but little introduction to any company concerned with either the manufacture or the distribution of chemical products. It would be difficult to think of any chemical merchant better known or more widely respected. For over forty years Mr. Page has had charge of a large and growing business, and though relieved to some extent now by able lieutenants, he still retains the active personal control at the London headquarters, and rarely misses daily attendance in the city. The ease with which he has borne the strain is probably explained by his habit of spending as much of his leisure as possible in the country, and his rule, during his week-ends at his Sussex house, of finding relief from business ties in pleasant country pursuits.

W. & D. Downey, Ltd.

MR. CHARLES PAGE.

The business of "Chas. Page & Co.," to give it its exact title, was founded on November 1, 1880, Mr. Charles Page being then the sole proprietor. In 1905 Mr. F. Lennard became a partner, and in 1906 Mr. F. J. Lovegrove joined the firm. In 1918 the business was, for family reasons, transferred to a private limited company, the partners being the first directors. Later Mr. Lionel Lennard and Mr. W. G. Wilson joined the board and are still members of it. In addition to the headquarters in London the firm have for some time had a large branch in Manchester, and only recently opened another in Glasgow.

In discussing business conditions, Mr. Page, though fully appreciating the difficulties of the present situation, was far from pessimistic. "My views," he said, "respecting the position and prospects of the chemical trade are distinctly on the hopeful side. At present the trade is suffering from two ills—one may be called internal and the other external. The internal is the low rate of production of the individual workman. This evil is widespread and raises the cost of plant, fuel, &c., as well as the actual costs in the working of the factory to such a level as to render competition with Germany and the United States almost impossible.

"The external ill is the generally disorganised state of the trade of the world and of Europe in particular, as is reflected in the abnormal and constantly fluctuating rates of exchange. There are plenty of potential buyers of our goods, but they can only gradually become actual buyers with the amelioration of the condition of the various countries. I have enough belief, however, in the common sense of the British workman and in the goodwill of the majority of leaders of the people in European countries to lead me to look for a gradually improving trade in chemicals.

Changes in Trading Methods

"Naturally, during my career," Mr. Page proceeded, "I have seen many new developments in the methods of trade. Forty years ago the custom of exporting goods on consignment for sale was getting into disfavour, although a very large proportion of the import trade was still done on those lines. To-day a very small part of any trade, either export or import, is done on the conditions of consignment for sale.

"The succeeding step in the chemical trade was the sale by the manufacturer of his products through a broker to the consumer or exporter. The most important development, however, has been the amalgamation of businesses into big companies who have set up their own selling organisations with agents throughout the world, and in some instances with branch offices at the more important centres of trade. In short, the combined manufacturers have become merchants of their own products, and have even gone further into the ramifications of a merchant's business.

"This has necessitated a change on the part of the individual manufacturer in his methods of selling in order to make a market for his products, and to-day, instead of waiting for the broker to bring him orders, he entrusts the sale of his goods to a merchant who makes a speciality of selling them. The merchant identifies himself with certain manufacturers of various lines of chemicals, and thus is able to present on the market a wide range of products and to incur expenses in selling such as no individual manufacturer could afford to incur.

"The merchant-agent not only sells for the manufacturers, but his technical staff deals with the proper methods of application of the chemicals in the buyer's works, and gives advice to the manufacturer with regard to the various saleable chemicals to which his works can best be applied. Thus the latest development in the method of selling gives the individual manufacturer all the benefits of the selling organisations of the big combines, while he retains the superior efficiency and economy of individual management of production."

Government Intervention

"Another very important change in the trade during my career is in regard to Government intervention in business. I was going to call it the political side of trade, but it is contended that the intervention is not political and has nothing to do with Free Trade or Protection, but is merely for the temporary adjustment of international inequalities in cost of production largely due to the irregularity of rates of exchange. This intervention is undoubtedly beneficial to the manufacturer of chemicals under present conditions in Europe, but one wishes that the Acts which have been passed had been less obscure to the layman. The doubt as to what may or may not be done has a paralysing effect upon trade. I should like to see the system of permits and licences abolished, and to know precisely on what articles a duty must be paid and the amount of that duty.

"The paramount question to-day, both for manufacturer and merchant, is that of the exchanges. The abnormally low value of many of the European currencies in relation to the pound sterling and the low value of the pound sterling to the U.S.A. dollar are factors which affect trade seriously, but the greater evil is the constant fluctuations which take place in these rates of exchange. This causes transactions for forward deliveries to be attended with so much risk either to the buyer or to the seller (according to which has to provide the sterling) that business is limited to near months in the majority of cases. The only cure for this serious state of affairs appears to be the return to a gold standard for all European currencies. This would entail a great sacrifice both to the country adopting it now and to the foreigner holding that country's securities, for in most cases it would be necessary to establish the value of the standard coin at much under its pre-war value. If, for example, the German mark were valued at the ratio of 500 to the English sovereign it would still necessitate many economies in that country to reach and to maintain that standard. I would, however, deprecate any attempt to alter the pre-war value of the English sovereign in relation to the U.S.A. dollar. We are strong enough financially to restore the equilibrium within a measurable time."

Neutral Sulphate of Ammonia

To the Editor of THE CHEMICAL AGE

SIR,—In his review in THE CHEMICAL AGE of the several methods for the production of neutral sulphate of ammonia, Mr. P. Parrish, of the South Metropolitan Gas Co., states very definitely some drawbacks to the Hansford Process, plant for which my company are both supplying and working.

Although to my knowledge he has not seen the plant at work, he is good enough to state that its practicability as regards small and medium-sized works is not questioned, although the process itself is described as "crude." Are we, therefore, to understand that a "crude" process is good enough for a small or medium-sized works, and that on the other hand for works staffed well with technical officials, such as the one with which he is associated, something far more "refined" is necessary, and that a plain enlargement of the process which can and does turn out an eminently suitable salt in medium-sized works is not good enough?

Referring to his objections, it is theoretically true that the precipitation of the impurities in the acid and also the tarry matter in the liquor does occur more rapidly on nearing neutrality in the saturator, but it is very desirable for many reasons in the manufacture of acid sulphate of ammonia to purchase a good quality acid and also as far as possible to eliminate tar from the liquor before entering the still.

On one plant acid with a high iron content was used, resulting in a brown colouration of the acid salt produced. On working the saturator down to neutrality, and drying and grinding the resultant neutral salt the colour, if anything, was improved.

Once more the problem of blue salt has been raised, found in practice to be non-existent. Experiments have been made at Bedford in working the saturator down far beyond the neutral point, with no formation of Prussian Blue occurring even when volatilisable cyanides have been ascertained to be passing into the saturator with the still gases, and also passing away with the waste gases.

Mr. Parrish says the formation of rock salt is inevitable. Then two plants working on the Bedford Process are still waiting for the inevitable, and but for this reminder rock salt would have been in the limbo of forgetfulness, having vanished with the scrapping of the draining floor.

Surely temperature consideration is important when discussing precipitation of impurities and formation of rock salt in the saturator, and as (as is the case of most gas works indirect processes) the saturator is more or less on the "boil" the reasoning why these "inevitables" do not occur is not very difficult, even to the individual who is not a chemist.

In conclusion, I would say I am looking forward to another patent from the South Metropolitan Co., and also crave pardon if I cannot quite see the supremacy over the alleged difficulties of the Hansford Process.—Yours, &c.,

R. MARSH.
(Managing Director of R. Marsh, Ltd.)

Cassiobury Works, Watford, February 1.

"Experience at a Discount"

To the Editor of THE CHEMICAL AGE

SIR,—You are to be congratulated on your leader in THE CHEMICAL AGE of January 21, for "experience" does really seem at a discount. If what I am writing of my own experience can add anything to the subject I shall feel more than recompensed.

Briefly, I have a lifelong experience (practical throughout) in the working of numerous industrial chemical and mineral manufacturing processes, having worked my way up from workman and foreman to works manager. My work has been somewhat unique in its variety, commencing with rock salt mining, brine pumping, and white salt making as applied to the alkali industry, of which I have some twenty odd years' works experience and by the best known processes. Added to this I have a knowledge of the making of a considerable number of other items as supplied to the textile, rubber, paint, and other industries. In the matter of strontium I have again a complete working knowledge from the digging of crude spar, right through to the manufacture of its carbonate and from that to the nitrating, &c. As may be readily imagined, I have an extensive knowledge of the economical working of many kinds of plant and machinery, *i.e.*, distilling, absorbing, decomposing, and crystallising ammoniacal and other liquids and gases.

Owing to financial difficulties of the parent company, the works I was engaged at as manager were at a standstill, and consequently since February 28, 1919, I have only had four months' work. Since then I have tried in every known direction, but owing to the slump I am as near getting employment as I was two years ago. Fortunately, I have been able to hold out by selling investments in War Loan, but that is practically wiped out, and one cannot go on indefinitely. The unemployment dole does not apply to me, and I hope it never will, for having through sheer hard work worked myself up, I do not want to go down again, with all the experience I have. I have not hesitated to apply for any kind of work, from works' foreman upwards. We have all, or nearly all, made our sacrifices during the war. My elder two sons were killed, and a third served two and a half years and is now a crock and can get nothing to do. Yet it doesn't appear to count much these days.

Although I am writing of my own experiences, I know there are many thousands as bad as or worse than myself—practical, clever men whose hearts are eating themselves out through a succession of disappointments and by no means their own fault. It is very hard to them to know that experience is at a discount, and that young men with hardly any practical experience or organising ability are running concerns not by their own knowledge, but from what they obtain from others and pass on as their own. Thanking you in anticipation for an insertion, and with all good wishes to your very up-to-date journal,—Yours, &c.,

TENEBO.

Institution of Chemical Engineers

To the Editor of THE CHEMICAL AGE

SIR,—I wish to inform you that the Memorandum and Articles of Association of the proposed Institution of Chemical Engineers have been drafted by the provisional committee appointed for the purpose at the preliminary meeting held at the Engineers' Club, 39, Coventry Street, London, on November 9, 1921. I know there are a number of chemical engineers in many parts of the country who up to the present have not expressed their interest in the proposed institution. If any of these gentlemen will place themselves in communication with me I shall be most pleased to furnish them with full particulars of the proposed project. Thanking you in anticipation,—Yours, &c.,

J. W. HINCHLEY, Hon. Sec.

Imperial College of Science and Technology,
South Kensington, London, S.W. 7.

Vacancies on the Admiralty Staff

THE Admiralty invite applications for the posts of Chief Scientist, and Scientific Assistant who should be physicists conversant with modern developments, and should have had considerable experience in and responsibility for research. Particulars may be obtained from the Secretary of the Admiralty, C. E. Branch.

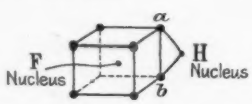
Notes on Some Recent Chemical Theories

IV.—Langmuir's Octet Theory

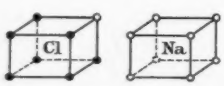
By Dr. Stephen Miall

THIS theory attempts to explain the shapes of atoms, the method of their aggregation in molecules, their electrical and other properties and the nature of valency. It has been much discussed, and on the whole seems to have been favourably received, or even generally accepted. I can only describe some of its simplest features, and if any suggestions are made as to the nature of the evidence in favour of the theory, it must be remembered that I am not biassed by any profound knowledge of the subject.

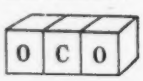
Langmuir assumes, as others do, that valency depends on the number of the electrons in the outer sphere, but he divides valency into two kinds—positive valency and negative valency, positive valency being the number of electrons given up by an atom, and negative valency the number of electrons taken up by an atom. His view is that with some exceptions the external electrons tend to form "octets," that is, to arrange themselves in space at the angles of a cube and that such cubes, either singly or joined together by sides or faces, represent the molecules of the various compounds. To give an instance: Sodium fluoride is a compound of sodium having one external electron with fluorine having seven external electrons; the two unite so as to arrange these electrons at the eight angles of a cube, sodium giving up one electron from its outer ring and fluorine taking up this electron to form the compound. The positive valency of sodium is 1, the negative valency of fluorine is 1. So, too, in a compound like calcium oxide Langmuir would view this as an arrangement, so far as the external electrons are concerned, of cubes with two electrons provided by calcium and six by oxygen; the calcium atom, having given up its two external electrons, is left with the next sphere of eight electrons, which also lie at the angles of a cube. The positive valency of calcium is 2, the negative valency of oxygen is also 2. According to this theory, hydrogen demands exceptional treatment; it has only one electron, and when it combines, for instance with fluorine, this electron takes up the eighth position in the octet, leaving the hydrogen nucleus, attached to two electrons, thus:



one of the electrons, *a* and *b*, has been contributed by the hydrogen atom. A body such as sodium chloride is represented thus:



each part is a separate electrified ion, the electrification of each arising because the chlorine atom has received an additional unit of negative electricity, and the sodium atom has lost an electron, and so one of the positive charges on its nucleus comes into play. Now let us consider carbon dioxide: The carbon atom has four external electrons, each oxygen atom has six. The carbon atom takes on two electrons from each oxygen atom, making eight, and the oxygen atoms are left with four each; but, nevertheless, three complete octets are formed after this fashion:



As two electrons are required to hold one atom of hydrogen, they are the equivalent in the combination of atoms to a single link or bond, and a combination of four electrons or one face of the octet or cube is the equivalent of a double bond. The theory, so far as I understand it, does not contemplate a triple bond such as seems to exist in acetylene.

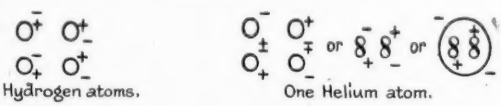
Langmuir does not assume that the various cubes are all of the same size, and he does not consider that all the octets are cubical, and he gives a rather tetrahedral shape to the carbon atom, thus:

It is easy to see that in any molecule the total number of electrons is eight times the number of octets, minus the number of electrons joining the octets together; this gives the equation $p = \frac{1}{2}(8n - e)$, where p is the number of pairs of shared electrons, n the number of octets, and e the total number of external electrons. The number of octets is the same as the number of atoms, except that hydrogen does not form an octet and is to be omitted from the calculation of n. The equation enables us to dismiss from consideration theoretical formulæ, which give negative roots, but it does not follow that the roots of the equation will in all cases give the constitution which Langmuir postulates. For instance, NaCl gives by the equation four pairs of electrons shared, and CO gives three pairs of electrons shared, which do not agree with his ideas of constitution. Again, take such a compound as IF_5: the equation gives a system with three pairs of electrons uniting six octets, which is a very short allowance. And PCl_5 should be six octets cemented together by four pairs of electrons, which is difficult for many of us to conceive. The equation obviously does not apply to elements of the iron and platinum groups, but nevertheless the theory is full of interest, and by making suitable allowances it fits in very well with the work of the Braggs on crystal structure, and with many of the facts of isomorphism. But it may well be that other explanations fit in equally with the observed facts; Pope and Barlow, some years ago, gave an explanation of crystalline form on the basis of close-packing of spheres, whose volume was proportional to the valency. This threw a good deal of light on isormorphism, but the exceptional cases make trial of every rule, a doctrine which we often misinterpret when we come across it in the form "the exception proves the rule." The Pope and Barlow hypothesis in its infancy broke down in so many cases that though its legitimacy has been maintained by its parents, the infant has since been, if not abandoned, at any rate left in a waiting-room. Barlow has introduced a modification of this close-packing sphere explanation, making the spheres all of equal size, but giving an atom with two valencies two spheres, carbon four spheres arranged in a pyramid, nitrogen three spheres and so on. He works on a system of valency, where the valency increases step by step up to four, then down again step by step to zero, which is very nearly what Langmuir does, though he calls it by another name. We have made such surprising progress in the last few years that we have a lot of counters to play with, and this always encourages the speculators. In spite of the warning of the materialists, who claim that the imaginative and metaphysical idea-grinding is like the blind man groping about in a dark room for a black hat which is not there, I propose an idea—perhaps expose it to the rude blast of criticism. It does not deal with valency. I know well that the expression of valency in terms of three-dimensional space is as far beyond my knowledge of chemistry as it is of my solid geometry.

Coming back, then, to atomic weights, which I maintain are of the form $2x + a$, where x is the atomic number and

a is independent of the chemical properties of the element, we are faced with the problem as to what this a consists of and where it is placed. Now a can be as small as 1 and as large as 54, and it can only consist of atoms of hydrogen either in that state or combined in the form of helium or something else of that sort. The first few elements are content with 1 unit of dead weight or none; neon is the first to have 2 units, chlorine the first to have 3, argon the first to have 4. We have, or at least I have, no knowledge of the way in which the units of matter are arranged in the nucleus, but it seems highly probable that in some cases the units are built up in a more complicated system than merely closely packed hydrogen atoms or nuclei, and I take it that such units as are on the outside of the nucleus will be able to make their electricity felt outside, but that any units lodged inside the nucleus, and more or less completely surrounded by positively charged units will be unable to affect bodies outside the atom. Now the number of units of dead weight so far as the first thirty or more elements are concerned seems compatible with the conjecture that they are internal units. If lithium with 6 live units can contain 1 dead one within it, neon with 20 live units may easily contain 2 dead ones, especially as the two may undergo some close packing or combination. Similar calculations as to the number of live units required to contain 3, 4, 5 and 6 units of dead weight do not show the conjecture to be impossible; but it is worthless to pursue the mathematics very far. The data are too conjectural. All I can say is that the figures involved are not too widely divergent, and the conjecture helps me to understand some of the radio-active changes. Why is it that uranium does not go on emitting a-particles until it produces an element like lead, and so on, indefinitely? Because, if it did so, it would have more dead weight than the shell of the nucleus would hold. The adjustment seems to me to take place as follows: after the loss of some a-particles and the rearrangement of the electrons so as to make the element come into its new place in the periodic table, it frequently happens that two units from the inside of the nucleus come to the outside and fill up part of the space previously occupied by the a-particles. The two units will throw off the electron which belongs to them, and the two units thus acquire a positive charge. The electron thrown off either goes directly to the outer ring or, if not, causes some other electron to take a place in the outer ring. So by this means the two units of dead weight are converted into live weight, and the element takes a higher place in the periodic table. The loss of a β-particle is the effect of the rearrangement of the nucleus not, I suppose, the cause of it.

If we consider a hydrogen atom consisting of a nucleus with a positive charge, and one electron hovering in the vicinity we must try and picture to ourselves what happens when four of these coalesce to form a helium atom. The four electrons do not persist, only two of them survive the operation, and we may diagrammatically express this as follows:



It is not necessary to assume these represent the shapes of the atoms or constituents of the atoms in question, but the diagrams show the sort of way in which two of the four electrons might disappear. Now these double units or half helium atoms persist right through the periodic table. Every loss of a β-particle is caused by or accompanied by a change of some sort in which one of these double units is concerned. These double units form the bricks out of which the elements are mainly constructed, and the fact that the atoms usually or invariably have whole number atomic weights shows that hydrogen atoms, as such, do not bulk largely in the atoms of other elements. The suggestion that these double units are added on in this way probably explains a good many of the arithmetical relationships of the atomic weights. The atomic numbers denote, hydrogen always excepted, the number of these double units, and we ought to have a name for them. Lucretius would have called them primordia, but if someone can think of a short and easy word to remind us of the labours of Thomson, Rutherford and Soddy, if ever I am rash enough to write on such a topic again I will carefully consider its adoption.

I consider helium as composed of two of these atomites, one must call them something, carbon as composed of six. And all the other elements as composed of other numbers, while some have in addition an odd hydrogen nucleus or atom (or a few odd ones), giving an odd value to the atomic weight. One may ask whether what we call helium is a monatomic atom or a molecule of two atomites? Whether helium has no chemical properties or whether the atomite has such violent and powerful affinities that it holds on to other atomites so that only bombardment can separate them? Whether it forms no chemical compounds or whether the compounds it makes are so stable that we call them elements? It is the arrangement of these atomites which decides the character of the element. Iron, cobalt and nickel have nearly the same number of them, but cobalt has one more live one than iron, and nickel one more live one than cobalt. And did we know how the atomites are disposed, and how the electrons which belong to the live ones are distributed we could explain why iron is trivalent and nickel divalent and why the crystals of nickel salts and cobalt salts behave magnetically in the singular manner pointed out a few years ago by Armstrong and Rodd, who found that the nickel crystals place themselves at right angles to the isomorphous cobalt crystals.

But these idle thoughts of an idle fellow must come to an end. As the poet says: "What is writ is writ, would it were worthier!" I have finished my four articles; how thankful we must all be that there are not thirty-nine.

A Correction

To the Editor of THE CHEMICAL AGE

SIR,—Will you permit me to correct a slip which appears in your issue of this date in a reference to my recent lecture on "Yeast," at University College? I am reported to have said that in 1 oz. of yeast there are 50,000 cells. What I said was that it has been calculated that in 1 oz. of pressed yeast there would be about 50,000 million cells. I was concerned in endeavouring to give my audience some idea of the minuteness of the yeast cell.—Yours, &c., A. CHASTON CHAPMAN.

London, January 28.

Faraday Society Publications

THE special conferences arranged by the Faraday Society from time to time have the advantage of collecting together the best and latest opinions on the subjects selected for discussion and the benefits fortunately are not allowed to disappear with the termination of the conferences. Under the editorship of the secretary, Mr. F. S. Spiers, the papers and reports of the discussion are later collected and published for permanent use, and the results are thus made available for a much wider constituency.

One of these volumes, just issued by the Society, deals with "The Failure of Metals under Internal and Prolonged Stress" (pp. 215, 10s. 6d.), and consists of the sixteen papers read at the conference in April of last year, with Dr. Rosenheim's introductory address and reports of the discussion. This, if less consecutive than a text-book by a single author, has the advantage of a greater variety in points of view and a wider range of knowledge and experience. In any case these papers are very well worth reproducing and the effect is stimulating and thoroughly educational.

Another volume on "Physico-Chemical Problems of the Soil," containing the papers and discussion at a conference held in May last, is now going through the press and may be expected to be published at an early date.

British Industries Fair

Industrial Chemicals at the White City

THE British Industries Fair, which will be held concurrently at the White City, London, and at Birmingham, from February 27 to March 10, bids fair to achieve an even greater measure of success than in the past. A new section, thoroughly representative of the chemical and allied trades, has been organised, and this section will, it is understood, form the largest and most comprehensive display of industrial chemicals ever shown in the United Kingdom. The Association of British Chemical Manufacturers have largely interested themselves in this section, and more than fifty of their members are exhibiting. The exhibits, which will include chemical products of every kind, fine and heavy, will be concentrated in the large hall immediately adjoining the Shepherd's Bush entrance to the fair, and products of the same class will, as far as possible, be exhibited in adjacent stands.

ENTRANCE TO THE CHEMICAL HALL, SHEPHERD'S BUSH, LONDON.

Among the firms exhibiting heavy chemicals will be the Acme Chemical Co., Ltd.; Albright & Wilson, Ltd.; Boake, Roberts & Co., Ltd.; Bowdler & Bickerdike; British Cyanides Co., Ltd.; Burt, Boulton & Haywood, Ltd.; J. M. Collett & Co., Ltd.; H. H. Dennis & Co., Ltd.; the Gas Light & Coke Co.; Keeling's Oxides, Ltd.; B. Laporte, Ltd.; the Marley Hill Chemical Co., Ltd.; Midland Tar Distillers, Ltd.; Orrs Zinc White, Ltd.; St. Helens Smelting Co.; the South Metropolitan Gas Co.; United Alkali Co., Ltd.; J. B. Wilkinson; and Wilson Brothers Bobbin Co., Ltd.

Dyes and intermediates will be shown by (*inter alia*): Ajax Aniline Dye Manufacturing Co., Ltd.; Alliance Colour & Chemical Co., Ltd.; British Alizarine Co., Ltd.; British Dyestuffs Corporation, Ltd.; Graesser Monsanto Chemical Works, Ltd.; Grays Dyes & Colours, Ltd.; Hickson & Partners, Ltd.; L. B. Holliday & Co., Ltd.; J. W. Leitch & Co., Ltd; North British Chemical Co. (England), Ltd.; Oxley's Dyes & Chemicals, Ltd.; James Robinson & Co., Ltd.; Scottish Dyes, Ltd.; J. B. & W. R. Sharp, Ltd.; Southdown Chemical Co.; and Williams Brothers & Co.

Some of the firms exhibiting fine chemicals are: Frederick Allen & Sons (Poplar), Ltd.; Allen (Stafford) & Sons, Ltd.; Boot's Pure Drug Co., Ltd.; British Drug Houses, Ltd.; Burroughs, Wellcome & Co.; W. J. Bush & Co., Ltd.; Evans, Sons, Lescher & Webb, Ltd.; Hopkin & Williams, Ltd.; Howards & Sons, Ltd.; Johnson & Sons (Manufacturing Chemists), Ltd.; J. F. Macfarlan & Co.; May & Baker, Ltd.; T. Morson & Son, Ltd.; Pierson, Morell & Co., Ltd.; J. L. Rose; Thomas Tyrer & Co., Ltd.; and Whiffen & Sons, Ltd.

Domestic chemical products, embracing cleansing preparations, medicines, polishes, toilet preparations, &c. will be shown by: Cussons, Sons & Co., Ltd.; J. T. Dale; Dubarry & Co.; Harker, Stagg & Morgan, Ltd.; J. G. Ingram & Sons, Ltd; John Knight & Sons, Ltd.; H. S. Lovell & Co.; Redio Co., Ltd.; Sanagen Co., Ltd.; Sorbo Rubber Sponge Products, Ltd.; and J. Watson & Co., Ltd.

Additional chemical exhibits will be supplied by Elel, Ltd.; B. L. & N. Phillips, Ltd.; C. A. Stokes & Co., Ltd.; and Rubber Tar, Ltd.; while in the Scientific and Optical Section the following firms will show their products:—John Bell & Croyden, Ltd.; British Glass Wool Co., Ltd.; Brown & Son; Cory & Grundy, Ltd.; E. B. Fry, Ltd.; William Gowlland (1916), Ltd.; Adam Hilger, Ltd.; North British Glass Works; Norton & Gregory, Ltd.; L. Oertling, Ltd.; Optical Manufacturers, Ltd.; Short & Mason, Ltd.; and Wood Brothers Glass Co., Ltd. Among the exhibitors in the Glass Section are: Amblecote Glass Works; James A. Jobling & Co., Ltd.; Kilner Brothers, Ltd.; James Powell & Sons (Whitefriars), Ltd.; H. C. Richardson & Sons; Stevens & Williams, Ltd.; Stuart & Sons, Ltd.; Thermal Syndicate, Ltd.; United Glass Bottle Manufacturers, Ltd.; Thomas Webb & Corbett, Ltd.; and Tunnel Glass & Bottle Works, Ltd.

At the Birmingham section there will be shown foundry appliances; machinery of all trades; metals (excluding precious metals); mining and quarrying plant; manufactures of indiarubber; weighing and measuring appliances and instruments; paints, colours and varnishes and painters' requisites. All the books, journals (including THE CHEMICAL AGE) and directories published by Benn Brothers, Ltd., will be on sale at Stand No. 4 in building "A."

Institute of Metals Programme

THE annual May lecture of the Institute of Metals will be delivered on May 3, by Sir Ernest Rutherford, F.R.S., on "The Relation of the Elements." The autumn meeting of the Institute will be held—for the first time—at Swansea, on September 20-22. From October to December (as well as during the present quarter) meetings of the various local sections of the Institute—membership of which is free to members of the parent body—will be held in London, Birmingham, Sheffield, Glasgow, Newcastle-on-Tyne, and elsewhere. It is expected that the growth of the Institute in 1922 will be even greater than it was last year, when the membership increased from 1,298 to 1,410. Such an increase, occurring during a year of great trade depression, indicates that makers and users of non-ferrous metals and alloys are now more than ever on the alert to take advantage of the scientific information obtainable through association with the Institute that exists to foster their interests. The Institute has just issued a pamphlet of thirty-two pages giving in summary form the results of over ten years' research into the causes and prevention of corrosion in condenser tubes. The pamphlet can be obtained, price 2s. 8d. post free, from the Institute of Metals, 14, Members' Mansions, London, S.W. 1.

Recent Wills

Mr. John Town, of North Grange Road, Headingley, Leeds, for many years head of Joseph Town & Sons, Ltd., papermakers, of Leeds and Keighley £39,511

Mr. William Patterson Evans, of Club House, Bidston Hill, Birkenhead, chairman of Evans, Sons, Lescher, and Webb, Ltd. £20,126

Mr. Carl Edward Melchers, 30, Drayton Gardens, South Kensington, formerly chairman of the Rosario Nitrate Co., Ltd. £227,623

Developments in Refrigeration

Paper by Dr. Ormandy and Mr. E. C. Craven

In connexion with the Chemical Engineering Group, a paper on "Potential Developments in Refrigeration," prepared by Dr. W. R. Ormandy and Mr. E. C. Craven, was read on Friday, January 27, at the Institution of Shipbuilders and Engineers, Glasgow, before the Glasgow Section of the Society of Chemical Industry.

In the paper refrigeration machinery was divided broadly into two classes—compression and absorption machines. The compression machines generally employed carbon dioxide, sulphur dioxide, ammonia or ethyl chloride, whereas the absorption machines were practically confined to the use of ammonia gas in conjunction with water. The bulk of the refrigerating work of the world was carried out by carbon dioxide and/or ammonia compression plants. The carbon dioxide plant worked at a very high pressure and was capable of producing very low temperatures, but the efficiency diminished very rapidly with increase in the temperature of the condenser water. The ammonia compressor plant ran at a much lower average pressure than the carbon dioxide plant, and its efficiency was not reduced to the same extent by variation in the temperature of the condenser water. The carbon dioxide compression plant was not employed in naval work, since a war vessel might be sent at short notice (say) from the North Sea to the Red Sea, and the temperature of the circulating water in the Red Sea would make the use of the CO_2 plant practically impossible. Most navies refused to employ the ammonia compression plant owing to the great danger of a breakdown accompanied by leakage of the ammonia gas into the confined spaces of the ship. It was, of course, customary for manufacturers to state that ammonia plants did not leak, but in practice leakages always occurred some time or another, and generally, to a smaller degree, most of the time. Many navies used the ethyl chloride compression plant in spite of its somewhat lower efficiency, and the larger size of plant necessarily employed. The lower pressure diminished the chance of leakage and the gas set free, due to leakage, was not so obnoxious as ammonia, but it had the drawback that the vapour and air form a combustible mixture. The sulphur dioxide compression plant had largely gone out of use.

The absorption type of plant had hitherto made use of the rapid solubility of ammonia gas in water. The principle was simple, but to carry it out economically required a somewhat complicated plant, and these complications were primarily brought about by the fact that on heating the watery solution of ammonia to drive off the ammonia gas, it was impossible to avoid driving off water vapour at the same time, and most of the complications were brought about in the handling of the residual and distillate liquors.

Years ago, the fact that solid ammonium nitrate absorbed ammonia rapidly and was thereby converted into liquid compound was suggested as the possible basis of an absorption ice machine, and much money and effort was spent in endeavours to carry the idea into practice. It was found that commercially dry ammonium nitrate did absorb ammonia gas with great avidity, and to the extent of something like 33 per cent. of its weight at ordinary temperatures. The liquid compound of ammonium nitrate and ammonia so produced, when heated to 100°C., gave off its ammonia against a back pressure sufficient to bring about liquefaction of the ammonia gas. As this reaction took place without any of the ammonium nitrate being decomposed or carried over with the gas, it appeared to have all the essential requisites for a satisfactory refrigeration process. Continual work, however, proved that the matter was not quite so simple as it appeared. There were conditions under which the amount of ammonia absorbed was insufficient to enable the process to be carried out commercially. An investigation of the chemical and physical relations of ammonia to ammonium nitrate was obviously necessary before any attempt at plant design could be made. In a practical plant it was obvious that the vessel containing the ammonium nitrate should be alternately absorbed and generated. As the ammonium nitrate was solid to commence with and became liquid as absorption took place, agitation was necessary to bring the whole of the mass into action, and the first commercial plant had rotary cylinders with coils to be used for steam for heating or water for cooling, according as the cylinder was serving as generator or absorber. Commercial plants on these lines had been made, and on a 2 ton plant 26 to 30 tons of ice had been produced per ton of coal.

As was well known, ammonia had the property of forming compounds with many salts by direct addition. With calcium chloride, for example, compounds containing 2, 4 and 8 molecules of NH_3 were formed. With aluminium chloride compounds with 1, 3, 5, 6 and 9 molecules have been reported. The compound with silver chloride would ever remain notable, since by the aid of this compound Faraday succeeded in liquefying ammonia in 1823. The equilibrium pressures for the two silver chloride compounds—2 Ag Cl. $3NH_3$ and Ag Cl. $3NH_3$ had been determined by Isambert (*Comptes R.* 66, 1215 and 70, 456), also by Hortsman (Ber. 9, 749) and by other observers. It had been shown that for every temperature there was a certain pressure at which neither absorption nor evolution of ammonia occurred, but equilibrium was established. This equilibrium pressure was independent of the relative amounts of the two compounds present, and was solely governed by the presence of the compound which contained most ammonia. The difference between the equilibrium pressures of the two compounds at any temperature was so great that it was not difficult to study the dissociation relations. In some cases, however, experiment had shown that it was almost impossible to determine equilibrium pressures for various temperatures owing to the slowness and irregularity of changes in such pressures.

When ammonia gas was passed over cooled ammonium nitrate, a colourless, rather mobile and highly refractive liquid was formed. At atmospheric pressure and ordinary temperature this liquid was found by M. Troost (*Comptes R.* 94 pp. 789) to possess the composition $2NH_4NO_3NH_3$. He determined the freezing point of the liquid as 22°C. It was also stated that a compound $NH_4NO_3NH_3$ appeared to be formed at lower temperatures.

A series of experiments were used to determine the vapour pressures of the ammonium nitrate and ammonia compound or mixture, and some curious results were obtained. It seemed impossible to avoid the conclusion that ammonium nitrate heated with a moderate amount of the liquid compound, under certain conditions, might pass into a cellular state favouring the absorption of ammonia, so that the full vapour pressure of the liquid compound was not exerted. This change of state was possibly connected with the well-known transitions of crystalline state of ammonium nitrate and with the formation of a lower compound $3NH_4NO_3NH_3$. It was noted that the liquid $2NH_4NO_3NH_3$ compound heated to 30°C. at atmospheric pressure left a dry porous residue containing about 5 per cent. of NH_3. This body on standing at ordinary temperature for twenty-four hours broke down to a crystalline mass of ammonium nitrate wet with the 2 : 3 liquid. It is possible in the experiment that at 65-70°C. and the pressure stated a similar change occurred. Moreover, the porous mass of ammonium nitrate left after driving off ammonia from the 2 : 3 compound absorbed ammonia several times as fast as the original crystals of nitrate.

It was obvious that to extend pressure measurements over a wide range of compositions some method of preventing the formation of the porous variety of ammonium nitrate would have to be adopted. The method adopted was furnished by some unpublished work performed by one of the authors and consisted in absorbing the 2 : 3 liquid compound in kieselguhr in such proportions that a dry powder was formed. Owing to the extremely fine division thus ensuing, the possibility of the formation of nitrate masses, porous or other, was reduced to a minimum.

In the application of the experimental results to practice it would appear that against back pressures up to 190 lb. per sq. in. absolute, *i.e.*, cooling water at 90°F., all the ammonia-ammonium nitrate bodies containing over 6 per cent. of ammonia were decomposed at a temperature of 230°F., *i.e.*, steam at 21 lb. per sq. in. absolute or 6 lb. pressure on the gauge. The heat required to drive off the remaining percentage grew very rapidly, and it would be economically unsound to attempt it. With cooling water at 76°F. (144 lb. absolute back pressure) all the bodies over 6 per cent. NH_3 were decomposed below the boiling point of water.

In order to decompose the ammonium nitrate ammonia compounds, especially those containing lower amounts of NH_3, it was necessary to agitate during the evolution period to avoid the formation of layers or to mix the compound with some absorbent such as kieselguhr. A stationary plant without agitation would work with ammonium nitrate-kieselguhr in the ratio 3 : 2 by weight, provided the cooling arrangements in the generator for the absorption period were adequate. There was no difficulty during generation with the absorbent present.

Society of Chemical Industry

Nottingham Section

A PAPER on "Recent Advances in Cotton Bleaching" by S. R. Trotman, M.A., F.I.C., and S. J. Pentecost, was read, on January 25, at a meeting of the Nottingham Section of the Society of Chemical Industry.

Referring to the tendency of cotton goods which have apparently been perfectly bleached to become discoloured on storing, the author's enumerated some well-known and preventable causes, such as the presence of oxycellulose, bacterial decompositions, and iron discolorations. They were of the opinion that the yellow colour not accounted for by these causes was due to waxy matters in the original cellulose not completely removed by the ordinary treatment. These waxes were sometimes highly-coloured, and were not easy to saponify; their preliminary removal by means of organic solvents was recommended. The use of organic solvent extraction before beetling was the subject of a patent by Cross & Fort. The waxes could also be converted into lime and magnesia soaps, which were best removed by a warm sour. According to Higgins, if this was followed by treatment with organic solvents, a further quantity of wax could be extracted. The author suggested that a warm sour followed by a degreasing with benzene and then a treatment with soda ash under pressure would remove the mineral matter and other undesirable constituents more completely and easily than the ordinary lye boil. A treatment with pancreatin after the warm sour would also be beneficial.

Bleaching was, in the authors' opinion, most easily effected by a warm dilute bleach, and preferably one with a high penetrating power like alkaline hypochlorites or free hypochlorous acid. There was thus less danger of the production of oxycelluloses, and, additionally, the residual waxy matters were more readily attacked by the bleach at a higher temperature.

Newcastle Section

At a meeting of the Newcastle-on-Tyne section of the Society of Chemical Industry, held in Newcastle, on January 25, Dr. J. H. Paterson, chairman of the Section, presiding, Mr. E. V. Chambers, of Lightcliffe, read a paper on "Tar Distillation."

Tracing the development of the tar producing industry, Mr. Chambers ascribed it to the growing use of tar by local authorities. Manufacturing methods had been so greatly improved that to-day more than half the total production of tar was distilled by the producer. Many tar producers had extended their plants for the complete distillation of tar, for the production of crude naphtha, light oil, creosote, and anthracene oil.

Gas works had an annual production of 1,000,000 tons of tar, and in that section three different types were produced: horizontal retort tar, vertical retort tar, and water gas tar. Viscosity tests (Sir Boverton Redwood viscometer) showed a difference in fluidity at 70°F. 50 c.c. as follows: horizontal tar, 1,690 seconds; vertical tar, 713 seconds. It was observed that tar from horizontal retorts contained less oils than from vertical retorts or water gas tar; vertical tar was richest in light oils, and water gas tar contained a large proportion of heavy oils with a low proportion of pitch. It was stated that in the cases given the water gas tar had the bulk of the water removed by mechanical means.

Dealing with coke oven tar, Mr. Chambers said that coke oven by-product recovery plants produced approximately 600,000 tons of tar per annum. Coke oven tar varied considerably in quality and generally contained considerable quantities of free carbon. Considerable quantities of Mond producer gas tar were produced in Great Britain. It contained a large proportion of water, generally in an emulsified condition, and the water did not readily separate by gravity. The tar produced by the low temperature carbonisation process differed considerably from ordinary gas or coke oven tar. It contained less of the aromatic hydrocarbons and more of the paraffin series. Moderate quantities of wood tar were produced from the dry distillation of wood and also at the producer plants using wood for making gas.

The process of tar distillation could, he thought, be regarded as an extension of the tar dehydration process. The intermittent or pot still process had been worked for the past one hundred years during which improvements had been introduced and some discarded and some retained, but in some parts of Great Britain horizontal stills were utilised, and in such cases it was thought that the system of circulation was less likely to produce foaming than in other designs, but the pot or vertical still was still the most largely adopted. Lantern slides illustrating the Alfa-Laval centrifugal machine and the Cascade plant with circular stills made by Chambers & Hammond, of Lightcliffe, were shown.

Discussion

Dr. W. B. Davidson said a long period of settlement in a warm condition in large underground wells was probably the simplest method of reducing the water content of tar to a low limit. Circulation or churning of the tar in contact with water should be avoided.

Mr. F. J. Colman said he believed in the principle of distilling tar in thin layers or, what would possibly be better, to distil it in as near tar fog as possible; it would then require fractional condensation. That would eliminate considerably the dangers of fire due to heating large quantities of tar in iron stills. He always favoured a continuous chemical process as the capital outlay was generally much less, but he had not yet heard of a continuous tar plant that would compare in costs and efficiency with the intermittent process. He believed the cascade dehydrator could be used successfully for many purposes other than tar distilling.

Mr. S. A. Wikner said that he had formed the opinion that frothing could not be stopped without recourse to pressure. The continuous process would appear to stop it, but the water would absorb a great deal of heat, and there would appear to be a tremendous amount of recondensation.

Rubber Vulcanisation

Characteristics and Uses of Organic Accelerators

AT a meeting of the Birmingham and Midland Section of the Society of Chemical Industry on January 26, Dr. Brownsdon presiding, Dr. D. F. Twiss and Messrs. S. A. Brazier and F. Thomas presented a paper on "Accelerators of the Vulcanisation Process."

Dr. Twiss pointed out that the paper was restricted in the main to an examination of the following accelerators: piperidine piperidyldithiocarbamate, diethylamine diethyldithiocarbamate, ethylamine ethyldithiocarbamate, dimethylamine dimethyldithiocarbamate, tetramethylthiouram disulphide, dimethylthiouram disulphide, tetraethylthiouram disulphide, zinc diethyldithiocarbamate and zinc ethylxanthate.

Dr. Twiss stated that in a review of the results included in the paper, the following typical characteristics of these dithiocarbamate accelerators might be given: (1) The production of vulcanised products of unusually high tensile strength. In one case a vulcanised sample withstood, without breaking, the highest load (100 kgs.) possible, with the testing machine, the corresponding stretch being 750 per cent. This stress was equivalent to a breaking load exceeding 3.4 kgs. per sq. mm., calculated on the original dimensions of the test piece, or more than 18 tons per sq. in. on the cross section of the stretched rubber. (2) The production of unusually great resistance to extension, relative to the extent of the chemical change and the alteration in the tensile strength. (3) The development of maximum tensile strength at an unusually low co-efficient of vulcanisation of the rubber. (4) The necessity of the concomitant presence of zinc oxide for full exercise of accelerative power even with the zinc dialkyldithiocarbamates. The salts, therefore, could not represent the actual catalysts, which must consequently be sought in some type of decomposition product common to the zinc salts, the amine dialkyldithiocarbamates, and the corresponding thiouram disulphides. (5) The tendency of the curve showing the alteration in extensibility (at 0.5 kgs./sq. mm.) to attain an early minimum if only a small proportion of zinc oxide was used. Under such conditions, the peak in the tensile strength curve lacked sharpness. The effect was probably connected with the initial formation of a limited quantity of highly active sulphur, the supply of which became rapidly exhausted. (6) The fact that alkyldithiocarbamates and thiouram disulphides derived from primary amines were much less powerful than the corresponding derivatives of secondary amines.

Mr. S. A. Brazier said that organic accelerators had great possibilities. On the theoretical side an investigation into the mode of action of these accelerators was likely to be of great assistance in solving the problem of the nature of vulcanisation itself; while on the practical side they formed

an important addition to the equipment of the rubber manufacturer. In comparison with the inorganic accelerators such as litharge, lime or light calcined magnesia, they possessed a distinct advantage in that they were generally readily soluble in rubber. Inorganic accelerators were only of limited solubility, and their activity was influenced by the surface area in contact with the rubber mixing. The rate of acceleration shown would largely depend on the conditions governing the methods of preparation. Organic accelerators, however, possessed an additional advantage in that it had been shown that they did not affect the different characteristics of vulcanisation to the same extent. It was, he thought, unfortunate that some of the accelerators placed on the market were being supplied under trade names and without any description of the class of chemical substances to which they belonged. The indiscriminate use of an accelerator of unknown composition might easily lead to disaster.

Mr. F. Thomas pointed out that in all the experiments referred to vulcanisation of the samples was effected in an oil bath. In testing an accelerator a convenient method of procedure was to vulcanise for varying periods a mixture of rubber sulphur and accelerator at 148°C. (=50 lb. steam pressure), and to judge the effect of the accelerator by comparing the results with those obtained for a simple rubber-sulphur mixture. There were many features of interest in connexion with zinc ethylxanthate which were not revealed by such a series of tests at 148°C. These showed zinc xanthate to give very feeble acceleration, and yet a trial vulcanisation for 40 minutes at as low a temperature as 108°C. with a mixture of the same composition yielded a well-moulded and certainly vulcanised rubber. Under similar conditions, the rubber-sulphur mixture, and indeed all accelerator mixings not containing zinc oxide, which they had tried in the Dunlop Co.'s laboratories, would fail to give a moulded product. It was thought that zinc xanthate might be a vulcanising agent, but an attempt to vulcanise without free sulphur failed. The presence of zinc oxide in the mixture had a very marked effect on the activity of this accelerator..

Mr. W. H. Howson mentioned that in an experiment where 25 per cent. of diethylamine diethyldithiocarbamate was employed in a solution in which no zinc oxide was present, vulcanisation was not observed even after twenty-seven days, the liquid condition being maintained.

Research at Leeds University

In the report to the Clothworkers Company of the Leeds University's Advisory Committee on the Departments of Textile Industries, Colour Chemistry and Dyeing, and Art, it is stated that the new laboratory in the Colour Chemistry Department has proved of great value and without it the number of students would have been greatly restricted. Though the entries for October last indicate that a falling off in students must be looked for, the entries since the conclusion of the War have been exceptionally large. In the Department of Textile Industries Professor A. F. Barker, M.Sc., states that the year has witnessed a beginning in the development of textile research on physico-chemical lines. A comprehensive scheme has been drawn up and considerable progress made. It is hoped to attract students from the pure science side of the university to textile research by linking such research to the B.Sc. (Hons.) degree in Chemistry. Of the researches noted in the last report several have been brought to a successful issue, and a special method of yarn testing has been worked out whereby the yarn strength is expressed in terms of fibre strength. This has resulted in much deeper insight into the spinning efficiencies of fibres. In the Department of Colour Chemistry and Dyeing the past session has been the busiest since the inception of the department.

Professor Fisher and "Synthetic" Gold

Writing from Berlin, a correspondent of the *Daily Telegraph* states that Professor Irving Fisher, who is at present in Germany investigating the "synthetic" gold story, has convinced himself that the whole thing is either a hoax or a fraud. He saw the man who claimed he was able to make gold at a cost only 10 per cent. higher than that of silver, and who said he had had some of his "synthetic" metal assayed and certified by the Reichsbank. It also proved true that the inventor, who refuses to have his name mentioned, took the bank a sample of gold which proved to be pure, but there was no means of testing his statements as to its origin. Further inquiry satisfied Professor Fisher that it would be wasting time to go further into the matter.

Chemical Trade Wages Deadlock

The position in regard to wage reductions in the chemical industry is still critical, and it is not yet certain that a crisis will be averted. The employers' proposal for a reduction of 2d. per hour on February 1 with a further reduction of 1d. on March 1 was on January 27 amended by a proposal to make a reduction of 1d. per hour from February 1 with two more reductions of 1d. on March 1 and April 1, respectively. The employers' side of the Joint Industrial Council, who held a meeting at the Ministry of Labour, placed this proposal before the workers' representatives, who were unable to accept it. On Thursday Mr. Kelly, secretary of the Workers' Union, informed a representative of The Chemical Age that while there was no definite information that a stoppage was inevitable, there was a very strong feeling, especially in two areas of the country, against acceptance of the present offer. A number of meetings had, he said, been held in various parts of the country, but further meetings would be held in certain districts during the week end. The workers, said Mr. Kelly, were quite willing to refer the question to further arbitration, but unless the employers modified their views this would be impossible.

Oil Extraction Plant Dispute

At a sitting of the Anglo-German Mixed Tribunal at Winchester House, St. James's Square, London, on Monday, consideration was given to a contract made before the war between a Scottish and a German firm for delivery of a plant for extracting oil from fish liver. Isaac Spence & Co. (Aberdeen) Ltd., Albert Quay, Aberdeen, claimed £600 from C. Schlotternose & Co., machinery manufacturers, of Geestemunde, Germany, this amount being part payment on account for the plant which had never been delivered. Mr. F. Wishart said the contract was for the delivery and erection of the plant in Scotland, and the instruction of the claimants' workers in its use. At the outbreak of war the time agreed upon for delivery had not expired. The contract was for 36,000 marks, and they claimed the return of their instalment money with interest. Dr. Barandon, for the German interests, submitted that the ownership of the plant had passed to the claimants before the war, and that its delivery was delayed at the claimants' request. Alternatively a claim of £300 for storage, &c., of the plant was put forward as a set-off against the £600 claimed. The Tribunal reserved judgment.

Finsbury Technical College Old Students

On January 27 old students of the Finsbury Technical College held an informal dinner and smoking concert at the Engineers' Club, Coventry Street, London, W. Mr. W. G. Head, M.I.Mech.E., president of the Association, presided and was supported by a number of past-presidents and vice-presidents, including Captain R. J. Wallis-Jones, O.B.E., W. J. Tennant, M.I.Mech.E., A. J. Chapman, F.I.C., Captain F. H. Masters, O.B.E., and several members of the council. Among the guests were Dr. Armstrong, F.R.S., of the Central Technical College, Mr. A. Chaston Chapman, F.I.C., F.R.S., President of the Institute of Chemistry, Mr. R. B. Pilcher, Registrar of the Institute of Chemistry, Professor A. J. Hale, F.I.C., and Mr. J. K. Catterson-Smith, M.I.E.E., of Finsbury Technical College. Under the direction of Mr. L. N. Clark a pleasing and well-varied musical programme was supplied by Messrs. R. Iles, G. M. Jeffreys, G. Thomas, Ivor Jones, and R. Fraser, with Mr. L. Regan, F.R.C.O., at the piano. Additional items were given by Mr. Pilcher, whose songs at the piano were received with great applause, and by Messrs. Grant and Tennant, who proved themselves to be raconteurs of no mean order.

Catalogue Received

A third revised edition of a pamphlet on the "Germ Process Motoils" has just been issued by the Henry Wells Oil Co., of 11, Haymarket, London, S.W 1. The pamphlet states that the "Germ" molecules combine with the mineral oil and cling to metal, and by increasing the capillarity of the oil ensure its permeating between metal surfaces. It is claimed that by means of the "Germ" process the lubricating value of mineral oils for many purposes is increased by over 25 per cent.

From Week to Week

Mr. Percy Hedley and Mr. Thomas Macdonald have joined the board of WAILES DOVE BITUMASTIC, LTD.

German exports of CHEMICALS AND GLASSWARE during December showed increases as compared with the November figures.

THE FALCON CHEMICAL AND RUBBER CO., LTD., have removed their offices and works to Lytham Street, Newton Heath, Manchester.

The DEATH occurred on January 25, at Wigram Road, Wanstead, of Mrs. Royle, widow of the late Mr. Thomas Royle, F.I.C., F.C.S.

Stocks of DYES AND CHEMICALS were destroyed by fire on January 26 at premises in Cheapside, Bradford, used as stores by a number of merchants.

MESSRS. A. E. HARRIS inform us that their chief office is now at 19, Russell Square, and that the telephone number there will be Museum 7646.

SIR FRANCIS BARKER, a director of Vickers, Ltd., and several other prominent companies, died at Cannes on January 28 in his fifty-seventh year.

It is announced that the offices of the *Journal of Industrial and Engineering Chemistry* have been removed to 810, Eighteenth Street, N.W., Washington, D.C.

THIRTEEN EMPLOYEES, with a total combined service of 670 years with the firm, have received presentations from Bryant & May, Ltd., of Fairfield Works, Bow, London.

Damage to the extent of several hundreds of pounds was caused on January 28 by an OUTBREAK OF FIRE at the Huddersfield works of the United Indigo and Chemical Co., Ltd.

MR. RAYMOND ROSS, Public Analyst for Burnley, is a member of a special committee of experts advising the Ministry of Health on the water supplies of the United Kingdom.

The death occurred at 275, Golfhill Drive, Dennistoun, Glasgow, on January 28, of MR. ROBERT MOTHERWELL, of R. Motherwell & Son, oil manufacturers, of North Wallace Street, Glasgow.

SIR WILLIAM VENO, governing director of the Veno Drug Co., Ltd., Manchester, is offering £10,000 as a supplement to Lord Atholstan's offer of £20,000 for the discovery of an effective cure for cancer.

A party of technical experts and financial advisers accompanied MR. R. F. CHEUX, chairman of Radium Ore Mines, Ltd., last week-end on a detailed inspection of the Tolgarrick Radium Mine, near Truro.

It is reported from the United States that Argentina has placed an order with E. I. du Pont de Nemours & Co. for a quantity of SMOKELESS POWDER sufficient to keep the plant busy for the next six months.

The master of a Dutch steamer was fined £5 at the Mansion House on Monday for UNLOADING EXPLOSIVES which were not labelled and packed in accordance with the Explosives Act and the Port of London by-laws.

MR. CHARLES ROBERTS has been re-elected chairman, MR. A. REE, vice-chairman, and MR. F. P. BAYLEY, hon. secretary, of the Chemical and Allied Trades Section of the Manchester Chamber of Commerce.

THE LEGAL ARGUMENTS in the appeals from the decision of Mr. Justice Sankey in regard to Brunner Mond & Co., Ltd., and the Manchester Ship Canal Co. were concluded in the Court of Appeal on Monday. The Court reserved judgment.

The following passes at Glasgow University in the examination for the degree of B.Sc. IN APPLIED CHEMISTRY are announced: Iron and steel, James Alexander Dobbie; metallurgy of non-ferrous metals, Martin Alfred Peacock.

It is reported that exhaustive tests have shown that the amount of organic matter in the soil of South Africa is generally low, and FERTILISERS ARE REQUIRED in the following order of importance: Phosphoric oxide, lime, nitrogen, and potash.

The contract for the supply of PUMPING MACHINERY for London's new reservoir at Littleton has been secured by Worthington-Simpson, Ltd., Queen's House, Kingsway, London. When completed the reservoir will be the largest artificial reservoir in the world.

The Senate of Cambridge University on January 27 gratefully accepted the offer of the General Committee of subscribers to the Rayleigh Memorial Fund of the sum of £687, being the balance of the fund, for the purposes of the library of the CAVENDISH LABORATORY.

A model of the ANCIENT ALCHEMIST'S HEARTH, accompanied by pictures of the elaborate processes which were then employed, is to be seen at the Wellcome Historical Museum, London, where a gallery is now devoted to exhibits illustrating the history of chemistry.

Applications are invited by February 27 for examiners (two for each subject) in chemistry and in physics for the 1922-3 Matriculation Examination in the University of London. Particulars may be obtained from the External Registrar, Mr. G. F. Goodchild, University of London, South Kensington.

Fairclough, Dodd & Jones, Ltd., 46, St. Mary Axe, London, E.C. 3, announce that Mr. Ernest G. Sawyer, who has for several years had the management of the Central Importing Agency (Board of Trade) for the distribution of German reparation dyes under the Peace Treaty, has been elected a director of the company.

In a report to the Birmingham City Council on the subject of RESEARCH WORK the Technical Education Committee state that they have had under consideration for some time past the question of the provision of suitable accommodation for research students in the Chemistry Department of the Municipal Technical School.

The next meeting of the London Section of the Society of Chemical Industry will be held in the rooms of the Chemical Society, Burlington House, Piccadilly, London, on Monday, February 6, at 8 p.m., when the following paper will be read: "RECENT WORK ON CATALYSIS AT SOLID SURFACES," by E. F. Armstrong and T. P. Hilditch.

The war bonus of operatives in the DYEING, BLEACHING, AND FINISHING TRADES is this week reduced from 33s. 3d. to 28s. 2d. for adult males; and from 19s. 10d. to 16s. 9d. for adult females. Owing to the lower labour charges the employers have issued reduced price lists for dyeing, bleaching, and finishing, the reductions varying from 5 to 10 per cent.

The recent ANNUAL BALL of the West Riding Section of the Society of Dyers and colourists, held at the Queen's Hall, Bradford, was thoroughly representative of the dyeing and allied industries. Music was provided by the White Coon "Royal Quartette" band. Mr. George G. Hopkinson, hon. secretary of the Section, and Mr. J. H. Ross acted as M.C.'s.

The Board of Trade have received a complaint under Part II. of the SAFEGUARDING OF INDUSTRIES ACT, by Metal Powders, Ltd., Radiant Products, Ltd., and the Aluminium Corporation, Ltd., in regard to gold (brass) metal powders and aluminium powder. The committee dealing with the complaint will commence the hearing at 5, Old Palace Yard, Westminster, on February 21, at 11.30 a.m.

In the Shoreditch Coroner's Court on January 27, Dr. E. Smith held an inquest on Mr. H. A. Keer, an employee at the white lead works of Champion, Druce, & Co., Southgate Road, Kingsland, London. The Coroner said the evidence clearly showed that death was due to LEAD POISONING. He returned a verdict of "death by misadventure," adding that, in his opinion, steps should be taken to minimise the possibility of the absorption of lead and that a rigid adherence to the regulations should be enforced.

Among the papers expected to be read at a meeting of the ROYAL SOCIETY on February 9 are "The Atomic Process in Ferromagnetic Induction," by Sir J. A. Ewing, F.R.S.; "Problems Relating to a Thin Plane Annulus," by Professor J. W. Nicholson, F.R.S.; "The Effect of Shallow Water on Wave Resistance," by Professor T. H. Havelock, F.R.S.; "The Aerodynamics of a Spinning Shell," Part II. (communicated by H. W. Richmond, F.R.S.), by R. H. Fowler and S. N. H. Lock; "The Kinetic Theory of a Special Type of Rigid Molecule" (communicated by Professor A. E. H. Love, F.R.S.), by F. P. Pidduck; "On the Velocity Distribution Function and on the Stresses in a Non-uniform Rarefied Monatomic Gas" (communicated by Professor S. Chapman, F.R.S.), by J. E. Jones; and "On the Numerical Solution of Linear Integral Equations" (communicated by Professor E. T. Whittaker, F.R.S.), by H. Bateman.

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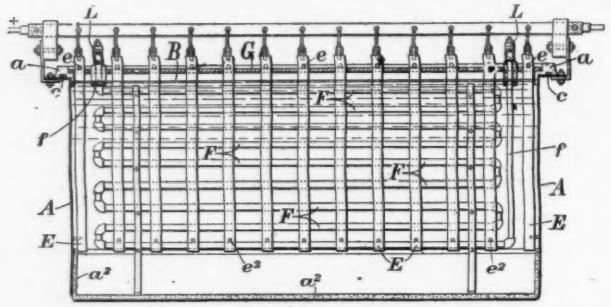
Abstracts of Complete Specifications

173,028. ELECTROLYTIC CELLS, MORE ESPECIALLY INTENDED FOR USE IN THE PRODUCTION OF THE CHLORATES OF THE ALKALI METALS. J. T. Barker and The United Alkali Co., Ltd., Cunard Building, Liverpool. Application date, September 10, 1920.

The apparatus is for electrolysing aqueous solutions of sodium and potassium chlorides with graphite or other carbon anodes at moderate temperatures to produce the chlorates. It has been found that the working temperature must not be above 35° to 40°C. owing to the rapid attrition of the electrodes, and that comparatively large cells may be used to effect the cooling to this point. The cell A is preferably of steel plate of ¼ in. thickness, with welded joints. The part above the liquid level B is protected by a layer of cement *a*, which is keyed to the cell by means of an iron rib *c*. The anodes E are long circular carbon rods symmetrically arranged around the four sides of the cell, and the bottom of the cell is protected by cement a^2 extending slightly above the bottom of the anodes. A cooling coil F is arranged centrally in the cells

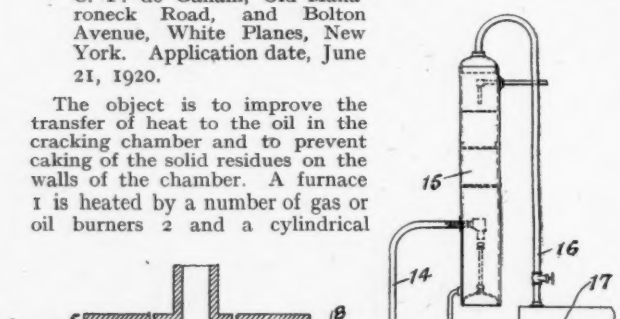


173,028

and its ends *f* are electrically connected by copper bars L to the cell A which forms the cathode. It is found that with this construction the cell walls and the coil F may be used as the cathode without corrosion. A rectangular cell to carry an average current of 1,500 ampères would have a length 8 ft., height 4 ft., and width 15 in. A layer of asbestos cement G is supported on the cement ring *a* and the rods E are supported by hard rubber pins *e* while glass pins e^2 prevent contact with the walls of the cell. The temperature is kept down to the required point by the large external surface of the cell, aided by the cooling coil F.

173,242. CRACKING OF OILS. R. H. Brownlee, 1902, Benedum Trees Building, Pittsburgh, Pa., U.S.A., and C. F. de Ganahl, Old Manaroneck Road, and Bolton Avenue, White Planes, New York. Application date, June 21, 1920.

The object is to improve the transfer of heat to the oil in the cracking chamber and to prevent caking of the solid residues on the walls of the chamber. A furnace 1 is heated by a number of gas or oil burners 2 and a cylindrical retort 3 is mounted on rollers 4 in the furnace walls. The oil is admitted by the axial pipe 7 projecting through the hollow shaft 5, and the vapour is drawn off by the pipe 8 projecting through the hollow shaft 6. The vapour pipe terminates in a tube 10 above the normal level of the oil. Oil may be drawn off through the downwardly projecting pipe 12, which is connected to a pipe 11 passing through the vapour pipe 8. The vapour then passes through a pipe 14 to a dephlegmator 15, from which a vapour pipe 16 leads to a water-cooled condenser 17. The retort contains a number of metal spheres, preferably of iron or steel, but a catalytic metal such as nickel may be used. These metal bodies may alternatively be cylindrical, conical or polygonal, and roll over the surface of the retort due to the rotation of the latter. The oil is thus agitated and brought into intimate contact with the metal bodies, so that the transfer of heat to the oil is facilitated. If cracking is carried on until solid coke is formed the coke may be broken into a finely-divided condition by continuing the rotation of the retort. For this purpose it is found that metal rods are more effective than spheres. An example is given of the treatment of a high viscosity oil such as Penuco crude oil. The lighter constituents distil off at temperatures between 675° and 825°F., and the heating is then continued to crack the residue of the oil. Any liquid or viscous residue may be removed under pressure through the pipe 12, while the pulverised coke may be blown through a manhole 25 by compressed air admitted through the hollow shaft 5.



173,242.

173,254. AZO DYES OBTAINED FROM CONIFEROUS RESINS AND THEIR PROCESS OF MANUFACTURE. R. Arnot, Neptunstrasse 69, Zurich, Switzerland. Application date, July 22, 1920.

It has been found that resins obtained from coniferæ, *e.g.*, colophony, may be nitrated and at the same time oxidised from hydro-aromatic combination to aromatic combination by treatment with fuming nitric acid. These products may be reduced to amines, which may be diazotised to yield azo dyes. Sulpho-acids may also be produced from abietic acid or colophony, which may be coupled with diazo components or may be converted into diazo-sulpho-acids. Colophony may also be distilled with lime by which the carboxylic group is split off and phenol-like substances are obtained. In an example, colophony is treated gradually with fuming nitric acid, and then heated slowly until a solution is obtained. This solution is poured into cold water, yielding a yellow precipitate of the nitro-compound. This compound is soluble in alcohol, ether, chloroform, acetic acid and benzol; also in alkalies and ammonia to an orange-brown colour. The amine may be obtained by reduction and may be diazotised in solution, yielding dye which, with R-salt, is bluish-red, with chromotropic acid is wine-red, and with R-acid is violet. The nitro compound may also be obtained by nitrating a solution of colophony in acetic acid. In another example colophony is distilled with burnt lime up to 300°C., yielding a greenish fluorescent oil resembling phenol. This is nitrated with a mixture of nitric acid and concentrated sulphuric acid, yielding a solid nitro-compound which is reduced and diazotised as before. The product is treated with a solution of α-napthylamine in acetic acid, and the precipitate washed with hot hydrochloric acid and dissolved in a hot 10 per cent. soda solution. The solution is acidified and converted into a dye

173,255. SOFTENING OF WATER, PROCESS FOR. G. G. Hepburn, 52, Newport Road, Chorlton-cum-Hardy, Manchester. Application date, July 24, 1920.

Water is softened by filtering through a mass containing the insoluble or slightly soluble salts of the alkali metals with humic or ulmic substances. The soluble salts in the water are thereby converted into insoluble compounds, which remain in the filter and may be reconverted by a regenerative process into the insoluble alkali salts for use again. In an example, the filtering material consists of raw peat or peat which has been treated with sodium chloride, carbonate, or hydroxide. This filter has a softening effect on hard water, and when exhausted it may be regenerated by treating with a salt such as sodium or potassium chloride, which converts the insoluble salt withdrawn from the water into a soluble salt. The softening power of the peat may be increased by adding humic or ulmic acid substances, which form insoluble or slightly soluble salts with the metals of the alkaline earths or the alkali metals.

173,268. ELECTROLYTE FOR USE IN THE ELECTRO-DEPOSITION OF METALS AND METALLIC ALLOYS. Q. Marino, 6, Arkwright Road, Hampstead, London, N.W. 3. Application date, August 25, 1920.

The object is to deposit nickel or cobalt, or their alloys with silver or tin, by electrolysis from a cyanide solution. A soluble salt of cobalt or nickel such as the nitrate, sulphate or acetate is neutralised with ammonia and mixed with a solution of sodium or potassium boro-tartrate and a solution of sodium, potassium, or ammonium formate. The precipitate is dissolved in potassium cyanide, and forms an electrolyte of high conductivity, from which a homogeneous coating may be obtained with a current of 5 to 10 ampères per sq. ft. and a voltage of 1 to 5 volts. If an alloy is required, a similar solution of silver nitrate or tin protochloride may also be added.

173,276. ARTIFICIAL MANURE OR FERTILISER. The Molassine Co., Ltd., Tunnel Avenue, East Greenwich, London, S.E. 10, and H. C. S. de Whalley, Park House, Brandram Road, Lee, London, S.E. 3. Application date, August 28, 1920.

Finely divided peat or peat moss is mixed with an ammonium salt such as the sulphate, which, when the product is applied to the soil, liberates sufficient ammonia to neutralise the free acid in the peat and render it slightly alkaline. This reaction is due to the presence of calcium carbonate in the soil. The ammonium sulphate is added in the proportion of 5 to 10 per cent., and a proportion of 5 to 15 per cent. of calcium carbonate is necessary in the soil. If the soil is deficient in calcium carbonate, the necessary amount must be added to the fertiliser.

173,300. HYDROCHLORIC ACID, MANUFACTURE AND PRODUCTION OF. J. Y. Johnson, London. (From Badische Anilin & Soda Fabrik, Ludwigshafen-on-Rhine, Germany.) Application date, September 23, 1920.

Specification No. 159,869 (*see* THE CHEMICAL AGE, Vol. IV. p. 567) describes a process for producing hydrochloric acid from its elements by arranging streams of chlorine and hydrogen to meet at a point at which a continuously burning igniting flame is placed to prevent explosions which might occur if the supply of gas is irregular. It is now found that a more complete combustion is obtained if the main flame burns in a downward direction. The chlorine and hydrogen are each introduced through concentric tubes of quartz into the top of a shaft furnace. The igniting flame is supplied with small quantities of chlorine and hydrogen through the inner tubes, while the main supply is passed through the outer tubes in the proper proportions. The lower part of the furnace is filled with a contact material such as brick, chamotte, pumice, quartz, or the like, containing a metal or a metal salt to act as a chlorine carrier and complete the combination of the two gases.

173,313. MORDANTS, MANUFACTURE OF, AND A PROCESS OF DYEING BASIC DYESTUFFS ON COTTON. W. Carpmael, London. (From Farbenfabriken vorm. F. Bayer & Co., Leverkusen, near Cologne, Germany.) Application date, September 27, 1920.

These mordants are produced by boiling phenol or its homologues or substitution products, other than phenols containing nitrogen, with aqueous caustic alkali and sulphur. In an example ortho-chloro-phenol is dissolved in a hot solution of caustic soda, sulphur is added, and the mixture heated to boiling for thirty hours under a reflux condenser. A resinous product is obtained which may be separated from the liquor, dissolved in hot sodium carbonate solution, and then salted out with sodium sulphate, yielding a greenish paste which is dried *in vacuo*. Similar products are obtained by using para-chloro-phenol, phenol, cresols, di-or poly-chloro-phenols, or the corresponding bromo-compounds. Cotton is mordanted with this product and then dyed with basic colours in the usual manner, yielding colours which are faster than those produced on tannin. The shades produced in using this mordant are the same as those produced by the tannin method with basic dyestuffs such as rhodamine B extra, methyl violet B, and auramine O.

173,337. METALS, MANUFACTURE OF, FROM THEIR SULPHIDES. E. E. Naef, 16, Loughborough Road, West Bridgford, Nottingham. Application date, October 5, 1920.

It has been found that the sulphides of lead, bismuth, silver, mercury, cobalt and iron, may be reduced to the metal by fusing with solid caustic soda in the presence of hydrogen or a gas containing it. The reduction takes place at temperatures of 300°-500°C., and the sulphur is converted into sodium-sulphur compounds, mainly sulphides, hydrosulphides, and thiosulphates. Steam is given off and the reduced metal remains at the bottom of the vessel. Lead and bismuth are obtained as a fused mass, mercury in fine globules, silver as a fine grey precipitate, cobalt and iron as dark powders. The fused alkali may be poured off for use again or the mixture may be run into water when the salts are dissolved and the metals precipitated. The process may also be effected with the addition of coal in the proportion of 5 to 10 per cent. of the weight of the sulphide used, when the reaction takes place at a lower temperature. Caustic soda may also be mixed with sodium carbonate, chloride, sulphate, sulphite, hydro-sulphide, or calcium carbonate, oxide or hydroxide. When the process is applied to a mixture of sulphides such as lead and zinc, antimony or cadmium, the lead only is reduced and the remaining sulphides form soluble double compounds with the caustic soda. If a mixture of cobalt-sulphur-arsenic compounds with cobalt-arsenic compounds is treated, metallic cobalt is precipitated, and sodium-sulphur and sodium-arsenic compounds are produced. In this case the presence of hydrogen or coal is unnecessary.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention 146,167 (Gerb.-und Farbstoffwerke H. Renner & Co. Akt.-Ges.) relating to tanning agents, *see* Vol. III., p. 320; 148,750 (H. Renner and W. Moeller) relating to artificial tanning agents, *see* Vol. III., p. 517; 151,000 (R. B. Ransford, L. Cassella & Co., Ges.) relating to dyestuffs, *see* Vol. III.; p. 635; 151,984 (C. T. Thorssell and H. L. R. Lunden) relating to ammonia from cyanides by heating in the presence of water, *see* Vol. III., p. 713; 153,574 (Nitrum Akt.-Ges.) relating to converting calcium cyanamide into urea, *see* Vol. IV., p. 133; 156,135 (L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés, G. Claude) relating to synthetic production of ammonia, *see* Vol. IV., p. 314.

International Specifications not yet Accepted

172,268. AIR AND GAS PURIFIERS. Halbergerhütte Ges., Halbergerhütte, near Brebach, Germany. International Convention date, December 1, 1920.

A purifier for air or gas is provided with a single control valve, which either allows the air or gas to pass through the purifier, or allows a current of clean air or gas to pass through in the reverse direction to regenerate the purifier. The valve may be either a slide valve, a piston valve, or a valve consisting of an oscillating segment, but in all cases the valve controls two ports so arranged that only one can be opened at one time. One port leads to the suction fan and the other from the fan which supplies clean air or gas to regenerate the purifier.

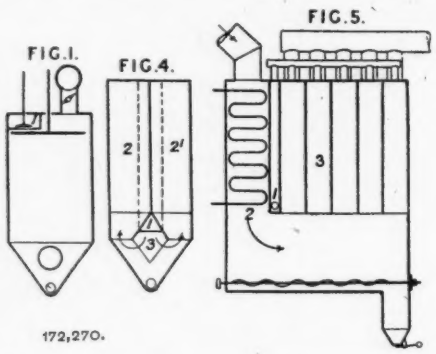
172,269. FILTERING GASES. Halbergerhütte Ges., Halbergerhütte, near Brebach, Germany. International Convention date, December 1, 1920.

Combustible gas such as blast furnace gas is superheated before filtering by the addition of a hot gas which may either heat the combustible gas by conduction, or may support the combustion of a portion of the gas. In one example, the gas passes through a conduit containing a pipe coil through which the hot gas passes. The hot gas may finally flow into the combustible gas or into the air. The hot gas may be obtained by admitting compressed air and gas into a combustion chamber filled with firebrick or other refractory material. The combustion products are passed through a water-cooled valve into the conduit containing the gas to be filtered.

172,270. PURIFYING GASES. Halbergerhütte Ges., Halbergerhütte, near Brebach, Germany. International Convention date, December 1, 1920.

When a filter is cleaned by a reverse current of gas, the cleaning gas is heated by the filter itself or by a portion of the crude gas superheater, a separate superheater being dispensed with. In one case, Fig. 1, the crude gas conduit is arranged above the filter, while the conduit 1 for the reverse flow is arranged under the filter cover, or both conduits may be adjacent and under the filter cover. In Fig. 4, the reverse

gas conduit 1 is placed between two filter chambers 2, 2', adjacent to the crude gas conduit 3. In Fig 5 the crude gas



superheater 2 and filter 3 are arranged as shown, with the reverse-flow gas conduit 1 arranged between them.

172,272. Decolorising Sugar Solutions. J. F. Straatman, 11e, Haaksbergerstraat, Enschedé, Holland. International Convention date, December 3, 1920.

A sugar solution is treated with an adsorbent which is filtered off, and then with a reducing agent, followed by more adsorbent. Alternatively, the reducing agent may first be used, or it may be applied without filtering off the adsorbent. Bone charcoal and sodium hydro-sulphite or sulphur dioxide may be used as the adsorbent and reducing agent.

Latest Notifications

174,317 and 174,331. Process for the manufacture of elastic flexible masses from nitro-cellulose. Claessen, C. January 21, 1921.

174,321. Process of producing comparatively low-boiling hydocarbons. Melamid, M. January 15, 1921.

174,327. Manufacture of hydrogen by the partial liquefaction of gas mixtures containing the same. Soc. Anon. pour l'Etude et l'Exploitation des Procèdés G. Claude. January 21, 1921.

174,349. Process of forming cakes of soap. Crouch, M. L. January 20, 1921.

174,364. Process for the production of alkali cyanide lyes. Deutsche Gold & Silber-Scheideanstalt vorm. Roessler. January 21, 1921.

174,370. Process for rendering soluble crude phosphate. Rhenania Verein Chemischer Fabriken Akt.-ges., & Rüsberg, F. January 24, 1921.

Specifications Accepted, with Date of Application

147,737. Coke-oven and like gases, Process of separating constituents from. C. Still (Firm of). November 1, 1918.

147,739. Coking ovens. Evence, Coppée et Cie. August 20, 1919.

148,366. Aldehydes and phenols, Process for the production of derivatives of the condensation products of. H. Bucherer. March 22, 1919. Addition to 148,139.

148,408. *Ar*-tetrahydro-β-naphthol, Preparation of. G. Schroeter and W. Schrauth. May 17, 1916.

148,419. *Ar*-tetrohydronaphthyl thioacetic acids, Process for the preparation of. Tetralin Ges. February 25, 1919.

148,567. Partial distillation of poor fuels, Process and apparatus for. I. Scherk. October 26, 1918.

148,764. Continuous testing of gas mixtures, Apparatus for. E. C. R. Marks. (*Union Apparatebau-Ges.*). July 10, 1920.

148,785. Tar, Manufacture of. C. Falk, M. Wangemann and C. Falk, Jun. December 10, 1917.

148,897. Tanning agents, Manufacture of. Chemische Fabriken Worms Akt.-Ges. August 17, 1916.

148,923. Nitro compounds of tetrahydro-naphthalene and its derivatives, Preparation of. G. Schroeter and W. Schrauth. March 16, 1916.

149,623. Saponaceous soda, Process for producing. A. Welter. July 24, 1919. Addition to 136,841.

153,007. Boronatrocalcite, Processes of decomposing. Schott and Gen. Oct. 24, 1919.

153,605. Terpineol, Process for the preparation of. R. Marchand. November 10, 1919.

153,877. Catalytic agents, Manufacture of. Barrett Co. Nov. 13, 1919.

155,814. Pure nitrogen, Processes for the production of. C. T. Thorssell and H. L. R. Lunden. November 16, 1920.

160,747. Oxalates and oxalic acid, Manufacture of. Oldbury Electro-Chemical Co. March 23, 1920.

170,867. Reduction products of nitro compounds of tetrahydronaphthalene and its derivatives, Preparation of. G. Schroeter and W. Schrauth. March 16, 1916.

173,786. Esters and materials containing esters, Process for the production of—from olefines. S. B. Hunt, June 30, 1920.

173,796. Dechlorides of monoaryl arsines and mono-chlorides of diaryl arsines, Manufacture of. Etablissements Poulenc Frères and C. Oechslin. July 10, 1920.

173,799. Siliceous substances, Drying and calcination of. H. Spence, I. P. Llewellyn, and P. Spence & Sons, Ltd. July 13, 1920.

173,805. Anthraquinone derivatives, Halogenation of. F. W. Atack and G. Robertson. August 5, 1920.

173,812. Electric furnaces. L. W. Wild and E. P. Barfield. August 11, 1920.

173,818. Neutral sulphate of ammonia, Manufacture of. J. B. Hansford. September 4, 1920.

173,830. Re-agent for concentration of ore by flotation, method of making and process of using same. A. E. Alexander. (*Luckenbach Processes, Inc.*) September 13, 1920.

173,881. Soluble condensation products, Manufacture and production of. J. Y. Johnson. (*Badische Anilin & Soda Fabrik.*) October 11, 1920.

173,907. Distilling bituminous materials, Process of and apparatus for. D. Pyzel. October 19, 1920.

174,013. Fractional condensation of mixtures of the vapours of volatile bodies, Apparatus for effecting. Selden Co., J. M. Selden, and C. G. Selden. July 5, 1920.

Applications for Patents

Akt.-Ges für Anilin-Fabrikation. Process for dyeing skins, hairs, &c. 1,673. January 19. Germany, January 29, 1921.)

Alger, H. P. and Frood, H. Vulcanisation of caoutchouc, &c. 1,619. January 19.

Belin, M. Process for treatment of caseins, gelatinous, albuminoidal, or cellulosic materials, and products resulting therefrom. 2,134. January 24.

British Dyestuffs Corporation, Ltd., Clemo, G. R., and Perkin, W. H. Manufacture of chloro-ethyl esters, and treatment of phenols, alcohols, and amino compounds with them. 1,697. January 19.

Burt, Boulton & Haywood, Ltd., Fergusson, H., Miles, F. D., and Warr, J. H. Manufacture of bituminous products from coal tar. 1,371. January 16.

Byrnes, C. P. Separating aldehyde fatty acids. 1,362. January 16.

Carmichael & Co., Ltd., J. F., and Guillaume, F. Apparatus for manufacture of sulphuric acid. 1,388. January 17.

Coolbaugh, M. F. and Read, J. B. Process of treating ores and concentrates to convert them into sulphates. 1,577. January 18.

Cooper, W. R. Low-temperature furnaces for production of smokeless fuel and gases. 1,969. January 23.

Cumberland Coal, Power & Chemicals, Ltd., Jaques, A., Tully, C. B., and West, J. H. Manufacture of hydrogen or gases rich in hydrogen. 1,691. January 19.

Deutsche Gold-und Silber-Scheideanstalt vorm. Rössler. Process for production of alkali cyanide lyes. 1,861. January 21. (Germany, January 21, 1921.)

Germain, P. and Kreutzberger, P. L. G. Burning heavy hydrocarbons. 1,895. January 21. (France, January 28, 1921.)

Holzverkohlungs Industrie Akt.-Ges. Method for chlorination of acetylene. 2,533. January 27. (Germany January 29, 1921.)

Loring, F. H. Centrifugal apparatus for breaking-up liquids and disseminating them in solids or for mixing and drying liquids and solids. 2,472. January 27.

Lucas, O. D. and Marshall, F. D. Production of finely-divided carbon and hydrocarbon derivatives. 2,539. January 27.

McRae, W. A. R. M. Treatment of bamboo, bagasse, &c., fibres for extraction of cellulose therefrom. 1,377. January 16.

Mehner, H. Production of cyano-compounds, &c. 1,430. January 17.

Menzies, R. C. Separation of acetone and methyl alcohol, &c. 1,734. January 20.

Naugatuck Chemical Co. Vulcanisation of rubber, and products obtained thereby. 1,594. January 18. (United States, May 28, 1921.)

Nesfield, A. C. Desulphurising mineral oils and spirits. 2,263. January 25.

Peachey Process Co., Ltd., and Peachey, S. J. Vulcanisation of rubber. 2,580. January 28.

Phillipson, G. A. Sulphate-of-ammonia drier and neutraliser. 2,322. January 26.

Rhenania Verein Chemischer Fabriken Akt.-Ges. Zweigniederlassung Mannheim, and Rüsberg, F. Process for rendering soluble crude phosphate. 1,987. January 23. (Germany, January 24, 1921.)

Scottish Dyes, Ltd. and Thomas, J. Method of producing anthraquinone-sulphonic acids. 1,575. January 18.

Twynam, T. Recovery of fixed atmospheric nitrogen. 1,631. January 19.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

LONDON, FEBRUARY 2, 1922.

WE are pleased to report that the past week has witnessed a decided improvement in the demand for many chemicals, and although buying is still in hand-to-mouth quantities, yet at the same time the general outlook seems to be more favourable.

Prices are particularly firm, and the tendency is towards an improvement in values.

The export market is without special feature, and, on the whole, rather quieter.

General Chemicals

ACETONE remains in good demand, and the price is very firm.

ACID ACETIC has again been advanced by Continental suppliers; stocks are short, and the tendency is decidedly stronger.

ACID FORMIC has been in much better demand, and is improving in value.

ACID LACTIC is quietly steady, in spite of the demand remaining rather slow.

ACID OXALIC.—Stocks are passing steadily into consumption, and the price is firmer.

ACID TARTARIC remains uninteresting; tendency in buyers' favour.

BLEACHING POWDER is unchanged.

CALCIUM CARBIDE.—There is no change to report in the position, although makers generally are expecting higher prices.

COPPER SULPHATE.—The export demand remains particularly poor, and the situation is complicated by cheap German offers.

FORMALDEHYDE is rather slow of sale, but stocks are firmly held.

LEAD ACETATE has been in better demand, but is at the moment without change in value.

LEAD NITRITE presents no special feature.

LITHOPONE.—A small business is passing at recent values.

POTASSIUM CAUSTIC is unchanged.

POTASSIUM CARBONATE remains a drug on the market, and buyers can practically name their own price.

POTASSIUM CHLORATE.—A fair business is reported; price unchanged.

POTASSIUM PRUSSIATE is firmer in tone; a fair business is reported.

SODIUM ACETATE is being well taken up, and makers are asking a higher level.

SODIUM BICHROMATE.—The demand is rather better, but any early change in price seems unlikely.

SODIUM CHLORATE has been inquired for, and a moderate business is reported.

SODIUM NITRITE remains slow of sale, but stocks cannot be replaced at present spot values.

SODIUM PRUSSIATE is particularly scarce for delivery over the next few months, and the price seems likely to go higher.

ZINC OXIDE is unchanged.

Coal Tar Intermediates

BUSINESS has continued on quiet lines, but this market is certainly becoming more interesting. It appears that the Continental competition is unable to give deliveries for some considerable time ahead. In view of this, home material for prompt delivery is beginning to move off on export account in spite of the difference in price.

ALPHA NAPHTHOL.—A small business has passed on home account.

ALPHA NAPHTHYLAMINE continues to pass steadily into consumption, and the price is unchanged.

ANILINE OIL AND SALT are not particularly interesting on home account, but a certain amount of business has been done for export.

BENZIDINE BASE.—Resale parcels seem to be pretty well absorbed, and this material continues in quiet demand.

BETA NAPHTHOL has been interesting and displays a slightly firmer tendency.

DIMETHYLANILINE has been inquired for.

DIPHENYLAMINE is very firm, and some fair business has been received.

"H" ACID.—Resale stocks seem to be clear, and this product is firming up.

NITROBENZOL is without feature.

PARANITRANILINE.—A small business is passing on home account.

PARAPHENYLENEDIAMINE is in request, and the price is firm.

"R" SALT.—A few small orders are in the market, but no large business is to be expected for some little time to come.

Coal Tar Products

THERE has been rather more inquiry for various coal tar products during the last few days, and a slightly increased volume of business has been passing. Up to now, however, it has had no effect on prices.

90's BENZOL is more plentiful and is selling at 2s. 5d. on rails.

PURE BENZOL is quiet and of little interest. The price is about 2s. 10d. to 2s. 11d. on rails in the North, and 3s. 2d. to 3s. 4d. in London.

CREOSOTE OIL remains unchanged, with little new business doing, and is worth 4¼d. to 5d. on rails in the North, and from 6d. to 6¼d. in the South.

CRESYLIC ACID is inactive and is worth 2s. on rails for the pale quality, and 1s. 10d. on rails for 95/97% quality.

SOLVENT NAPHTHA has had rather more inquiry during the past week, but the business appears to be all on account of one buyer in the Midlands. The improved inquiry is not general throughout the country, and the price is not affected. Solvent is worth about 2s. 4d. on rails.

NAPHTHALENE is very quiet, and there is little business doing. Crude qualities are worth from £5 to £8 per ton, and refined qualities are quoted at from £15 to £17 per ton.

PITCH.—The market is somewhat quieter, but prices are well maintained. To-day's quotations are 62s. 6d. to 65s. f.o.b., London; 60s. to 62s. 6d. f.o.b. East Coast; and 57s. 6d. to 60s. f.o.b. West Coast.

Sulphate of Ammonia

The home position is unchanged, and the demand for export is somewhat more active.

Current Prices

Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	10	to	0	2	0
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	82	10	0	to	85	0	0
Acid, Acetic, glacial, 99-100%	ton	55	0	0	to	60	0	0
Acetic, 80% pure	ton	47	0	0	to	48	0	0
Arsenic	ton	90	0	0	to	95	0	0
Boric, cryst	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	1	to	0	2	2
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	3	9	to	0	4	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol	ton	40	0	0	to	43	0	0
Lactic, 60 vol	ton	43	0	0	to	45	0	0
Nitric, 80 Tw	ton	35	0	0	to	36	0	0½
Oxalic	lb.	0	0	8	to	0	0	8
Phosphoric, 1.5	ton	45	0	0	to	47	0	0
Pyrogallic, cryst	lb.	0	7	0	to	0	7	3
Salicylic, Technical	lb.	0	0	10½	to	0	1	0
Salicylic, B.P	lb.	0	1	4	to	0	1	6
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0

	Per	£	s.	d.		£	s.	d.
Acid, Tannic, commercial	lb.	0	3	0	to	0	3	6
Tartaric	lb	0	1	3	to	0	1	4
Alum, lump	ton	12	10	0	to	13	0	0
Alum, chrome	ton	30	10	0	to	32	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	13	10	0	to	14	10	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	10
Ammonia, .880	ton	35	0	0	to	37	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	90	0	0	to	95	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to		—	
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, Chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	14	10	0	to	15	10	0
Nitrate	ton	40	0	0	to	42	0	0
Barium Sulphate, blanc fixe, dry	ton	24	0	0	to	25	0	0
Sulphate, blanc fixe, pulp	ton	15	0	0	to	16	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to		—	
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
" " Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	7	10	0	to	8	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	10	6	to	0	11	0
Copper chloride	lb.	0	1	3	to	0	1	0
Sulphate	ton	28	10	0	to	29	0	0
Cream Tartar, 98-100%	ton	120	0	0	to	125	0	6
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol	ton	81	0	0	to	82	0	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	4	5	0	to	4	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols	gal.	0	2	6	to	0	2	7
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	42	10	0	to	45	0	0
Carbonate (White Lead)	ton	44	0	0	to	47	0	0
Nitrate	ton	48	10	0	to	50	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	26	0	0	to	27	0	0
Magnesium chloride	ton	10	10	0	to	11	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	9	10	0	to	10	0	0
Sulphate (Druggists')	ton	15	10	0	to	17	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	90	0	0	to	95	0	0
Nickel sulphate, single salt	ton	61	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potash, Caustic	ton	34	0	0	to		—	
Potassium bichromate	lb.	0	0	7¾	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride 80%	ton	15	0	0	to	20	0	0
Chlorate	lb.	0	0	4½	to	0	0	5
Meta bisulphite, 50-52%	ton	112	0	0	to	120	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	9	to	0	0	10
Prussiate, red	lb.	0	2	4	to	0	2	6
Prussiate, yellow	lb.	0	1	2½	to	0	1	3
Sulphate, 90%	ton	20	0	0	to	22	0	0
Salammoniac, firsts	cwt.	3	5	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	26	0	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	5¾	to		—	
Bisulphite, 60-62%	ton	25	0	0	to	27	10	0
Chlorate	lb.	0	0	3¾	to	0	0	4
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	10	0	to	26	0	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	13	10	0	to	14	0	0
Nitrite, 96-98%	ton	37	10	0	to	40	0	0
Phosphate, crystal	ton	20	10	0	to	21	0	0
Sodium Perborate	lb.	0	1	2	to	0	1	3
Prussiate	lb.	0	0	10	to	0	0	10½
Sulphide, crystals	ton	13	0	0	to	14	0	0
Sulphide, solid, 60-62%	ton	24	10	0	to	25	0	0
Sulphite, cryst	ton	13	0	0	to	14	0	0
Strontium carbonate	ton	60	0	0	to	65	0	0
Strontium Nitrate	ton	60	0	0	to	62	10	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6½	to	0	1	7
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Tin perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102 Tw	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	35	0	0	to	40	0	0
Oxide, 99%	ton	38	0	0	to	40	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	18	10	0	to	19	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	2	0	to	0	2	3
Aniline oil, drums extra	lb.	0	1	0	to	0	1	1
Aniline salts	lb.	0	1	1	to	0	1	2
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	6	to	0	5	9
Benzidine, sulphate	lb.	0	5	6	to	0	5	9
Benzoic acid	lb.	0	1	10	to	0	2	0
Benzoate of soda	lb.	0	1	9	to	0	1	11
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	4	9	to	0	5	0
Betanaphthol	lb.	0	1	9	to	0	2	0
Betanaphthylamine, technical	lb.	0	6	0	to	0	7	0
Croceine Acid, 100% basis	lb.	0	3	6	to	0	3	9
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	2	9	to	0	3	0
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	0	10	to	0	1	0
Dinitronaphthaline	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	5	to	0	1	6
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	2	6	to	0	2	9
Diphenylamine	lb.	0	4	3	to	0	4	6
H-Acid	lb.	0	6	6	to	0	7	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	0	to	0	6	6
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	3	3	to	0	3	6
Naphthionate of Soda	lb.	0	3	3	to	0	3	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base	lb.	0	10	0	to	0	10	5
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	1	6	to	0	1	9
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	10	0	to	0	10	6
Para-amidophenol, hydrochlor	lb.	0	10	6	to	0	11	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled	lb.	0	11	0	to	0	11	6
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	2	9	to	0	3	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	0	to	0	7	3
Salol	lb.	0	2	3	to	0	2	6
Sulphanilic acid, crude	lb.	0	1	0	to	0	1	1
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Society of Chemical Industry: Manchester Section

AT a meeting of the Manchester Section of the Society of Chemical Industry on Friday, papers on "The Estimation of the Nitro Group in Aromatic Organic Compounds," Part II, and "The Use of Potassium Bromate in Volumetric Organic Analysis," both by Dr. T. Callan and Dr. J. A. Russell Henderson, were read.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

GLASGOW, JANUARY 31, 1922.

THE long-hoped-for improvement in trade is developing very slowly. Sales in the latter half of January were good in point of numbers, but the volume of business left much to be desired.

Prices have been generally well maintained, and there are few indications of important reductions.

Alkali products are in limited request and prices are steady.

The turnover in acids continues unsatisfactory; inquiries for acetic acid are fair.

Export inquiries for industrial chemicals are more plentiful, with little real business.

German chemicals are not arriving in any great quantities, and are quoted dearer.

German export merchants are busy with circulars, but in many cases they are unable to deliver the goods against orders.

Quite a number of inquiries of small dimensions are on the market for coal tar intermediates for export.

Industrial Chemicals

ACETONE, B.G.S.—Firm at £75 to £80 per ton, with limited supplies available.

ACID ACETIC (GLACIAL).—£55 per ton; 80 per cent. pure, £47/50 per ton; 80 per cent. technical, £45 per ton. Brisker inquiry and prices firmer. Supplies not too plentiful.

ACID BORACIC.—No change and very small trade. Crystals, £65 per ton. Powder, £67 per ton.

ACID CARBOLIC, 39/40°.—Inquiries light and no change in price at 6d. per lb.

ACID FORMIC, 80 PER CENT.—Small inquiry. £65 per ton asked.

ACID NITRIC, 80°T.—Some business passing at £27 10s. per ton, ex works.

ACID OXALIC.—A little more inquiry. Quoted at 7¾d. to 8¼d. per lb. delivered, according to destination.

ACID SULPHURIC.—(Oleum, 20 per cent.). Some business has been placed around £6 15s. makers' works, buyers' packages.

ACID TARTARIC.—Poor demand. Offered at 1s. 3¾d. per lb. delivered.

AMMONIA, ANHYDROUS.—1s. 9d. to 1s. 11d. per lb. delivered, according to destination. Demand poor.

AMMONIA CARBONATE.—Small consumption. Lump, 4d. per lb. Ground, 4¼d. per lb. delivered.

AMMONIA, MURIATE (GALVANISERS).—Home makers' prices lower at £36 per ton, but resale parcels still offering at £30/32 per ton.

AMMONIA, NITRATE, 32/34 PER CENT.—Business slow, at £22 10s. per ton. Some good sales of recovered quality have been made around £20 per ton ex Government surplus.

AMMONIA, SULPHATE.—Brisker inquiry for February delivery. Neutral selling at £16 3s. and ordinary 25¼ per cent. at £15 per ton.

ARSENIC.—Inquiries are scarce. White Cornish firm at £40 per ton, ex works.

BARIUM CHLORIDE, 98/100 PER CENT.—Market dull. Home make offering at £13 10s. per ton, ex works. Continental about the same price, but delivery doubtful.

BARIUM NITRATE.—Very small demand. £40 per ton asked.

BARYTES.—Grey, £4 per ton. White, £6 per ton. British made somewhat scarce. Continental cheaper in low grades.

BLEACHING POWDER.—Prices unchanged and consumption still low. Spot delivery, £15 to £16 per ton delivered.

BORAX.—No change in price and in steady request for small orders. Crystals, £31 per ton. Powder, £32 per ton, delivered.

CALCIUM CARBIDE.—Continental parcels still arriving against moderate demand. Price about £20 per ton delivered.

CALCIUM CHLORIDE.—Inquiries unimportant. British makers' price unchanged, at £7 10s. per ton, with Continental slightly cheaper.

COPPERAS.—Green crystals. Very little business and price nominal.

EPSOM SALTS.—Druggists' quality, £10 10s. per ton, f.o.r. works, with a steady small inquiry. Commercial quality quoted cheaply by Continental producers, but delivery more than doubtful.

FORMALDEHYDE, 40 PER CENT.—Slow movement and price firm around £76/78 per ton, ex works or store.

LEAD ACETATE.—White, £44 per ton. More inquiry, but sales slow.

MAGNESITE.—Ground calcined. Stocks moderate. Very little improvement. £12 to £13 per ton.

MAGNESIUM CHLORIDE.—Little inquiry and stocks fair. Price, £8 to £9 per ton, ex store.

POTASSIUM BICHROMATE.—No change but slightly improved sales at 7½d. per lb. for spot lots.

POTASSIUM CARBONATE, 90/92 PER CENT.—£29 per ton. In moderate demand. Stocks light.

POTASSIUM CAUSTIC, 88/92 PER CENT.—£33 per ton. In moderate demand. Stocks light.

POTASSIUM NITRATE. REFINED.—Rather better inquiry. Price unchanged at £35, with sales of Government recovered surplus at less money.

POTASSIUM YELLOW PRUSSIATE.—In moderate demand, at 1s. 3d. per lb.

POTASSIUM SULPHATE, 90 PER CENT.—Moderate inquiry at £16 per ton, ex ship.

SODIUM ACETATE.—Few inquiries. £24 per ton, delivered, asked.

SODIUM BICARBONATE, REFINED.—No change. £11 10s., ex station.

SODIUM CARBONATE, 58 PER CENT. (REFINED ALKALI).—No change. £10 per ton, ex quay.

SODIUM CARBONATE (SODA CRYSTALS).—£6 per ton, ex quay.

SODIUM NITRATE.—A dull market, and pressed for sale at £13 15s. to £14, ex store.

SODIUM NITRATE, 100 PER CENT.—Moderate inquiry and no change, at £32 per ton delivered, with resale parcels offering at slightly less.

SODIUM HYPOSULPHITE.—Commercial, £15 per ton in casks. Pea crystals, £20 per ton in kegs, with moderate demand.

SULPHUR.—Sicilian Thirds, in bulk at £4 5s. to £4 15s. f.o.r. according to quantity. Some Government surplus stocks still available.

SULPHUR DICHLORIDE.—Some important orders have been placed at £18 10s. per ton, ex works.

ZINC DUST, 98 PER CENT.—Fair demand for export. Around £37 to £40 per ton, f.o.b. U.K. port.

WAXES.—Rather better inquiry at the reduced prices: 118/120° M.P., 2½d. per lb., delivered; 135/140° M.P., around 3d. per lb., delivered; Japan wax, small sales at £90 per ton.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—A few inquiries for home trade. 2s. 1d. per lb. delivered.

ANILINE OIL AND ANILINE SALT.—No change. Small business passing at 1s. and 1s. 1d. per lb. respectively.

ANTHRANILIC ACID.—Small inquiry for home consumption. 15s. per lb. 100 per cent. basis, delivered, asked.

BENZIDINE BASE.—Some inquiry and few orders for export at 8s. 6d. per lb. 100 per cent. basis f.o.b. U.K. port.

BENZOL.—Parcels of crude more freely offered. Around 1s. 8d. per gallon. Consumers holding off for lower prices.

BETA NAPHTHOL.—A few inquiries for home trade. 2s. 3d. per lb. asked.

DIMETHYLANILINE.—A few inquiries on the market. Price 2s. 10d. per lb. asked.

DINITROCHLORBENZOL.—Several good inquiries on the market for home and export. £90 to £95 per ton asked, packages included.

DIPHENYLAMINE, 51/52°C.—Small inquiry for home and export. Price around 4s. 6d. per lb.

ETHYL-BENZYL-ANILINE, 99/100 PER CENT.—Small export business passing at 8s. 4d. per lb. f.o.b.

ETHYL CHLORIDE.—1s. 6d. per lb. quoted f.o.r. against home inquiry.

"H" ACID.—Home price, 7s. per lb., with Continent offering at considerably lower.

METANITROPARATOLUIDINE.—Small inquiry. 9s. per lb. asked.

METAPHENYLENEDIAMINE, 90 PER CENT.—Little business passing for export. 6s. 6d. per lb. f.o.b. U.K. port.

META XYLIDINE.—Few inquiries. 7s. 10d. per lb. 100 per cent. basis quality.

MONOCHLORBENZOL.—£80 per ton quoted against inquiries for home consumption.

NAPHTHIONIC ACID.—Offered at 2s. 11d. per lb. 100 per cent basis.

PARALDEHYDE.—Commercial, small inquiry for home trade. £137 per ton c.i.f. U.K. quoted.

PICRIC ACID, 95/97 PER CENT.—Offered at 10d. per lb. f.o.b., packages included. Recovered Government surplus available at a concession.

SALICYLIC ACID.—Prices lower for technical quality, at 8½d. per lb.

TOLIDINE BASE.—Quoted at 7s. per lb. 100 per cent. basis.

TOLUIDINE.—Some inquiry for export. Offered at 1s. 11d. per lb. drums included, f.o.b.

TOLUOL.—Commercial, offering at 2s. 10d. per gallon, carriage paid.

Potash

DURING the past week sylvinite was sold freely in the southern counties of England, where there is always a good demand for this grade of potash for the winter top-dressing of meadows and down lands. Orders are also coming to hand for supplies required for the spring sown crops, as lower prices are now considered to be out of the question, and the chances of a rise during the spring months become more evident, the present prices being scarcely sufficient to cover the cost of production. Current quotations remain steady at the following prices :—

Kainit 14%	£2	12	6	in bags f.o.r.	London.
Sylvinite 20%	3	12	6	,,	,,
,, 30%	5	12	6	,,	,,
Muriate of Potash 50%	10	10	0	,,	,,
Sulphate of Potash 90% purity	14	10	0	,,	,,

The offices of the mines in Alsace report that the working of the mines has been re-organised to allow of the employees participating to a certain extent in the profits of the industry. The number of operatives in the mines has increased from 2,534 in January, 1919, to 6,721 early in 1921, and now it is stated that 5,100 additional workers will be required.

German Chemical Trade Notes

(FROM OUR OWN CORRESPONDENT)

Berlin, January 30, 1922

THERE have been a number of export inquiries of considerable size for industrial chemicals, and the opinion is held in some quarters that this fact may bring about further price increases. The best-favoured product has been copper sulphate, important purchases of which have been made. The situation generally is uncertain. The demand for pharmaceuticals holds up remarkably well, and the turnover is fair. Depreciation of the mark has assisted export trade in this branch. The latest quotations in kilos. (d. = domestic price; e. = export price) are :—

Acid, Acetic, 80%, chemically pure, 19 mk. d., 21.50 mk. e.; glacial, 98/100%, 25 mk. d., 29 mk. e. Acid Oxalic, 98/100%, 48 mk. d., 52 mk. e. Acid, Sulphuric, 60°, 4.50 mk. e., 66°, 6 mk. e. Alum, powdered, 6.50 mk. d., 7.50 mk. e.; in lumps, 8 mk. d., 9 mk. e. Chrome Alum, 15%, 20 mk. d., 25 mk. e. Ammonia Carbonate, 13 mk. d., 15 mk. e. Borax, powdered, 26/36 mk. d., 38 mk. e.; crystallised, 35 mk. e. Calcium Chloride, 90/95%, 4 mk. d., 4.60 mk. e. Copperas, 3 mk. e. Copper Sulphate, 98/100%, 19 mk. d., 21 mk. e. Glauber's Salt, crystallised, 2 mk. d., 2.75 mk. e. Red Lead, 25 mk. d., 31 mk. e.; White Lead, powdered, 26 mk. d., 31 mk. e.; in oil, 25 mk. d., 32 mk. e.; Lead Acetate, 27/30 mk. d., 32 mk. e. Lithopone, red seal, 30%, 10 mk. d., 15 mk. e. Potash Carbonate, 80/84%, 16 mk. d.; 90/95%, 18 mk. d.; 96/98%, 21 mk. d., 25 mk. e. Potash Caustic, 88/92%, 24 mk. d., 22 mk. e. Caustic Potash liquor, 50°, 13.50 mk. d., 18 mk. e. Potassium Chlorate, crystallised, 18 mk. d., 22 mk. e.; powdered, 17 mk. d., 18/20 mk. e. Potassium Prussiate, red, 145/155 mk. d., yellow, 95 mk. d. Salt Cake, loose, 3.10 mk. d., 3.25 mk. e. Soda, crystallised, 3 mk. d., 4 mk. e. Soda, Sulphide, 30/32%, 8 mk. d., 10 mk. e.; 60/62%, 14 mk. d., 17 mk. e. Zinc Chloride, 15.50 mk. e. Zinc Oxide, 90/92%, 12/16 mk. d. Zinc Sulphate, 4 mk. d. Zinc White red seal, 23 mk. d., 30 mk. e.; green seal, 26 mk. d., 33 mk. e.

The market for coal tar products is unchanged with demand light and supplies not extensive. Some second-hand offerings were noted at lowered prices.

Acetone substitute is sold at 39 mk. per kilo. Anthracene oil is worth 325 mk. per 100 kilos. Betanaphthol, 55 mk. per kilo. inland and 70 mk. per kilo. export. Coal Tar is worth 250/260 mk. per 100 kilos., distilled. Creosote Oil is held at 325 mk. per 100 kilos. Naphthalene, crude, hot pressed, 500 mk. per 100 kilos.; centrifuged, 200 mk. per 100 kilos.; and dropped off, 180 mk. per 100 kilos.

Chemical Merchants' Affairs

Pierre Marrotty

THE first meeting of creditors of Pierre Marrotty, 129, Cannon Street, London, chemical merchant, was held at the London Bankruptcy Court on January 25, before Mr. F. T. Garton, Official Receiver. The debtor had stated that in 1918 he commenced business on his own account as a chemical merchant at 129 Cannon Street, London, with a capital of £95. In November, 1920, he converted the business into a company, and was appointed managing director at £750 a year. He gave one of his creditors 200 shares as security for a debt due to the Distillers' Chemical Supply Co. He left the company in December last, and was now in a situation at £8 per week. The company was still in existence, but was doing no business. His liabilities amounted to £1,700, of which £900 was in respect of a judgment obtained by a creditor for breach of contract for the supply of oxalic acid. He estimated his assets at about £100, and attributed his failure to heavy interest on borrowed money and poor trade owing to the general labour conditions. Asked by the Official Receiver if he had any offer to make to his creditors, the debtor said he hoped to be able to bring forward a proposal to pay 5s. in the £, but he would have to get the money from his relatives in France, and to them, owing to the exchange, it would mean 10s. in the £.

The Official Receiver said the debtor could not offer less than 5s. in the £, and he could bring in the proposal at any time, but for the present the estate would remain in the hands of the Official Receiver for summary administration in the usual manner.

Samuel Vine

A RECEIVING order has been made against Samuel Vine, late of 222-4, Harrow-road, W., on the petition of Mr. H. W. Buckingham, the trustee in the bankruptcy of Joseph Vine, who formerly traded under the style of the Toilet Supply Co. The statutory first meeting of creditors was held last week at the London Bankruptcy Court, and the Official Receiver reported that the only proof of debt lodged was by the petitioning creditor for £350. The debtor had not surrendered to the proceedings, and nothing was known of his present whereabouts. The case was left in the hands of the Official Receiver for administration in bankruptcy.

Affairs of the Keene Company

IN the Bankruptcy Court on January 27 Mr. Registrar Francke conducted the public examination of Mr. Irvine Alexander Keene, formerly carrying on business at 52, Gray's Inn Road, London, and in New York, as the Keene Co. The debtor was adjudged bankrupt in November last (*see* THE CHEMICAL AGE, Vol. V., p. 572), and a statement of his affairs showed liabilities of £10,818 and assets valued at £2,046.

In reply to the Official Receiver, the debtor attributed his failure mainly to his liability for calls on shares in a public company. He was the owner of three secret preparations, known as Keene's One-Night Corn Cure, Keene's Cold Cure, and Keene's Razorine Paste. He said he was not prepared to write out and hand to the trustee the formulæ of these preparations.

The Official Receiver said he understood that the bankrupt's brother was a wealthy man, and it had been suggested that he might make an offer to the creditors. In that case there would be no necessity for the debtor to disclose the secret. The debtor said the trustee in bankruptcy was employing him, at £5 a week, to mix the preparations, and the business was now making more profit than it had made for three years. The examination was adjourned.

The following are among the creditors : British Dyestuffs Corporation, Ltd., Manchester, £333; Baltic Export Co., London, £125; Adolf & Co., London, £1,300; T. Morson & Sons, London, £21; Johnson & Sons, London, £10; A. Keene, London, £2,000; and Parke, Davis & Co., London, £517. The claims of fully secured creditors amount to £350.

Company News

CONSETT SPANISH ORE.—An interim dividend of 1s. per share is announced.

CAPE COPPER CO.—Proxies have been sent out in connexion with an arrangement made with the Cordoba Copper Co.

JURGENS, LTD.—A dividend for the half-year at the rate of 7 per cent. was payable on Wednesday to holders of 7 per cent. (guaranteed) cumulative preference shares registered on January 16.

HERBERT MORRIS, LTD.—Warrants for the half-year's dividend to January 31, 1922 on the 6 per cent. (less tax) and 5 per cent. (tax free) cumulative preference shares were posted on Tuesday.

ANTON JURGENS VEREENIGDE FABRIEKEN.—A dividend for the half-year to December 31 last on the 6 per cent. cumulative participating "B" preference shares is payable forthwith, less tax at 6s. in the £, to holders registered on January 20.

ENGLISH VELVET & CORD DYERS ASSOCIATION, LTD.—The directors have declared a dividend at the rate of 10 per cent. per annum on the ordinary shares, making 8 per cent. for the year, less tax. £20,000 is placed to reserve and £25,689 is carried forward.

MOND NICKEL CO., LTD.—The directors announce an interim dividend of 6d. per share on the ordinary shares, free of tax, on account of the year to April 30, 1922, and an interim dividend of 3½ per cent. on the cumulative and non-cumulative preference shares, payable on March 3.

ANGLO-PERSIAN OIL CO., LTD.—It is announced that there were over 50,000 applications for the new issue of capital and that the amount subscribed for the preference shares was over £21,000,000, and for the ordinary shares over £36,000,000. The directors regret that some time must necessarily elapse before it will be possible to issue allotment letters and letters of regret.

BRITISH OIL AND CAKE MILLS.—A further dividend of 5 per cent., less tax, on the ordinary shares, making 10 per cent., less tax, for the year, is announced. The dividend is payable on March 6. The ordinary share registers will be closed from February 18 to March 4 inclusive. It is hoped that the accounts will be in the hands of shareholders by the end of April.

MASON & BARRY, LTD.—Referring to their circular dated September 28 last, the directors inform shareholders that the negotiations for the proposed sale of the company's property in Portugal have fallen through. The directors further state that although shipments of pyrites during 1921 were slightly less than during 1920, they have no doubt that the result of the year's working will be entirely satisfactory.

JOHN KNIGHT, LTD.—The profit for the year to November 30 last was £164,145, and £44,557 was brought in, making £208,702. After providing for a dividend on the cumulative preferred ordinary capital at 25 per cent. per annum, the directors propose a dividend on the ordinary shares at 30 per cent. per annum, leaving to be carried forward £62,702. The annual meeting will be held at the Great Eastern Hotel, Liverpool Street, London, on February 17, at 2.30 p.m.

SCOTTISH MAIKOP OIL WELLS, LTD.—In a circular to shareholders the directors state that a contract has been entered into for the purchase of an estate in Trinidad. The purchase consideration is £50,000. The terms of payment have been arranged as follows: £10,000 by way of a 5 per cent. royalty on the value of the oil produced; £20,000 by the allotment of 20,000 £1 preference shares; £10,000 to be secured by a debenture payable in five years, or earlier, at the company's option; and £10,000 in cash by instalments extending to September 30, 1922.

ESPERANZA NITRATE CO.—The report for the year states that the gross profit was £64,207 and the net profit £56,012. In the terms of the debenture trust deeds this sum should be paid to the trustees for debenture redemption purposes, but as large new borrowing operations would be involved by so doing the directors decided to call meetings of all classes of debenture holders to obtain their sanction to modification of rights, and it was agreed by special resolution that all profits earned by the company to June last are to be retained in the business of the company. The board recommend that the available balance on profit and loss account be appropriated as to £37,090 in extinction of expenditure held in suspense account, and £18,921 to reduction of debit on profit and loss account.

ALLEN-LIVERSIDGE, LTD.—The report for the year to October 31 last shows a net profit of £30,468, which, with the amount brought in, and after deducting the interim dividend, leaves a disposable balance of £20,289. The directors propose a further dividend at the rate of 10 per cent. per annum, less tax, making 10 per cent. for the year, writing off expenses in connexion with the new issue, and sundry amalgamation expenses, £4,092, placing to reserve against Corporation Profits Tax, £1,750, and carrying forward £3,240. In May last a public issue of 106,280 shares at par was made in order to obtain funds for the repayment of temporary advances and for necessary extensions. In response to this issue, 30,415 shares were applied for and allotted. As this subscription was not sufficient to finance the objects in view, the directors have arranged for a loan of £100,000 to be secured by the issue of 8 per cent. debenture stock to that amount. Details are now being settled, and it is hoped the transactions will be completed before the adjourned general meeting which will be held at Caxton Hall, Westminster, on February 7, at noon.

Tariff Changes

FIJI.—A revised Customs tariff which provides for the levying of preferential rates of Customs duty on goods the produce or manufacture of the British Empire. In cases where specific duties are leviable, the rates of duty under the British Preferential Tariff are generally half of the corresponding rates under the General Tariff. The complete schedule may be seen on application to the Tariff Section, Department of Overseas Trade, 35, Old Queen Street, London.

ITALY.—Antimony ores, and beetroot saline ("salino potassico") may now be exported without the requirement of an export licence.

Progress at Cambridge University

THE report of the General Board of Studies at Cambridge University states that the reports for 1920-21 show great activity on the part of all the scientific departments of the University. The number of students attending the various courses has remained much the same, but the congestion which rendered satisfactory teaching so difficult has been much relieved by the completion of new buildings. The new north wing of the chemical laboratory has been finished and the alteration to the old north wing far advanced. The new engineering laboratory has made good progress, and it is hoped that it will soon be possible to provide accommodation for the Professor of Physical Chemistry in part of the building vacated by the engineering department. The extension of the Cavendish laboratory has been completed, and has provided accommodation for the staff and for research, while space for its classes of practical physics for Part I. of the Natural Sciences Tripos has been found in the old engineering laboratory. It is hoped that it may be found possible to provide for the needs of anatomy, mineralogy, and zoology, and to grant more space to the philosophical library when the new biochemical and engineering laboratories are completed and occupied. Owing to the great increase in the cost of material and in the wages bills, which has not been accompanied by a corresponding increase in the fees, some laboratories are faced with considerable deficits on the year's working.

Magnetic Separator Patent Dispute

JUDGMENT has been given by the Appeal Court of the German Patent Office on an appeal entered by Fried. Krupp A.G., of Grusonwerk, Germany, against the grant of a German patent applied for by H. H. Thompson and A. E. Davies (of the Rapid Magnetting Machine Co., Ltd., of Birmingham). The action was in connexion with an electro-magnetic separator for separating feebly magnetic ores from other ores, by means of a high-intensity magnetic separator, for which patents have already been granted in England and many other countries. The opposition of Messrs. Krupp was successful in the Examination Department, but the English inventors appealed. After the hearing of the appeal the higher Court decided that there was a patentable invention, but they required a practical demonstration in Berlin of the machine. The English inventors dispatched a machine to the German Patent Office, and went over to Berlin on November last. After a series of experiments the decision of the tribunal was reserved, but it has now been issued, annulling the decision of the lower Court and allowing the patent.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnership Dissolved

SCHROEDER, Edward Frank, HORWELL, Thomas Edward, SWEETINBURGH, Charles, WILLIAMS, Herman, and WILD, Edward James, manufacturers of Heron Cold Glue, 35, Tabernacle Street, Finsbury, under the style of The Heron Cold Glue Co., by mutual consent, as from December 31, 1921. The business will in future be carried on by E. F. Schroeder, T. E. Horwell, H. Williams, and E. J. Wild.

Application for Discharge

WILLIAMS, William Eleder, 12, High Street, Swansea, chemist and druggist. Hearing, March 7, 2 p.m., Town Hall (Nisi Prius Court), Swansea.

Companies Winding Up

FOOD OILS, LTD. Winding up order, January 27.

HERCULIN GLUE AND COMPOUNDS CO., LTD. First meetings at 29, Russell Square, London, W.C. 1., February 9; creditors at 12 noon, and contributories at 12.30.

MASON & SONS, LTD. H. D. Leather, 10, East Parade, Leeds, appointed liquidator in place of C. S. Wooldridge.

Company Winding Up Voluntarily

FUERST BROTHERS, LTD. V. S. Wright, 40 King William Street, London, E.C., appointed liquidator. Meeting of creditors at the liquidator's office on Monday, February 6, at 12 noon.

Liquidators' Notices

BRAMLEY DYEING CO., LTD. (In Voluntary liquidation) Particulars of claims by February 28 to T. Paton, 3, Piccadilly, Bradford, or J. H. Haley, 29, Tyrrel Street, Bradford, the joint liquidators.

PETROSINE CO., LTD. (In Voluntary Liquidation.) Particulars of claims by March 8, to A. Nicholson, 89, Albion Street, Leeds, the liquidator.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BIGNALL, P. W., Nightingale Road, Derby, chemist. £11 19s. 0d. November 17.

BOWMAN, Alex., Lowther Arcade, Carlisle, chemist. £21 5s. 11d. November 18.

BRADLEY, ——, Front Street, Shotton Colliery, chemist. £47 17s. 10d. November 24.

MENZIES, James, 87, Commercial Road, Southampton, manufacturing chemist. £18 4s. 2d. November 21.

NEWMAN, A. Pointon, Newman's Drug Stores, 51, Thompson Street, Barry Dock, chemist. £19 14s. 1d. November 21.

STANSFIELD, John Lord, 54, Booth Road, Waterfoot, Chemical director. £10 7s. 10d. Nov. 21.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

BRITISH GAS PURIFYING MATERIALS CO., LTD. London, N.—Registered January 21, (by order on terms), £2,000 debentures; general charge. *Nil. May 7, 1921.

HOME GROWN SUGAR LTD. Newark-on-Trent.—Registered January 20, £40,000 mortgage, to National Provincial & Union Bank of England, Ltd.; charged on hereditaments and premises comprised in mortgage registered August 23, 1921, securing £75,000. *Nil. June 22, 1921.

SOCIETE INDUSTRIELLE DU RADIUM, LTD., London, E.C.—Registered Jan. 12, Trust deed dated December 21, 1921, securing 500,000 francs and £5,000 debenture stock; general charge, except certain ore lying above ground at South Terras Mine, St. Stephens-in-Branwell. *£8,400. January 4, 1922.

VICTORS, LTD., Manchester, chemical manufacturers.—Registered January 18, £3,000 and £1,500 debentures, part of £35,000; general charge. *£3,500. March 7, 1921.

Satisfactions

BLEACHERS ASSOCIATION, LTD., Manchester. Satisfactions registered January 16, £30,000, part of amount registered April 6, 1918; and £17,000, part of amount registered August 16, 1918.

LIVERSEDGE & COCK, Dobcross, dyers.—Satisfaction registered. January 19, £3,000, registered. December 14, 1920.

SLATER & CO., LTD., Bolton, bleachers. Satisfaction registered January 16, £6,000, part of amount registered January 15, 1912.

Receivership

TREECE (GEO. D.) & CO., LTD. T. G. Thielford, of 119-120, London Wall, E.C.2, was appointed receiver or manager on January 20, 1922, under powers contained in debentures dated February 12, 1917, and June 25, 1918.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C. 2:—

ASTRON MANUFACTURING CO., LTD., 1, New Oxford Street, W.C. Manufacturing chemists, &c. Nominal capital: £6,000 in 2,000 cumulative pre-preference shares of £1 each, and 24,000 preference shares of 1s. each, and 56,000 ordinary shares of 1s. each.

ATKIN'S DRUG STORES, LTD., 215, Holloway Road, N. Chemist and druggist. Nominal capital, £500 in 500 shares of £1 each.

CHEMICAL SUPPLY CO., LTD., drysalters, &c. Nominal capital: £20,000 in 20,000 shares of £1 each. A director: E. Newmann, 220, Cromwell Road, London, S.W.

F. S. HANKINSON'S PHARMACY, LTD., 62, Brockley Rise, Honor Oak Park, S.E. 23. Drug stores. Nominal capital, £1,000 in 1,000 ordinary shares of £1 each.

LONDON DRUG CO., LTD., 573, Station Road, Brixton, S.W. Chemical manufacturers and dealers, &c. Nominal capital, £6,000 in 2,500 preference shares and 3,500 ordinary shares of £1 each.

REGENT PETROLEUM CO., LTD., 72, Regent Street, London, S.W. Manufacturers of crude and refined oils and all products or by-products of coal, shale, oil, &c. Nominal Capital: £1,000 in 1,000 shares of £1 each.

RUDOK, LTD. Wholesale and retail chemists, drysalters, &c. Nominal capital, £2,000 in 2,000 shares of £1 each. A subscriber: A. Wilcocks, 29, Cantlowes Road, Camden Square, N.W. 1.

STEAD & CO., LTD., 23, Duke Street, Brighton. Drug stores, photographers and photographic dealers. Nominal capital, £1,500 in 1,500 shares of £1 each.

WILLIAM WILD & CO., LTD., 14, Market Place, Manchester. Chemical manufacturers and merchants. Nominal capital, £1,000 in 1,000 shares of £1 each.

Company Registration in Ireland

AMONG the first few companies incorporated at the new Registry of Joint Stock Companies, which has been established at Belfast to deal with registrations within the jurisdiction of the Government of Northern Ireland, is that of T. L. Campbell & Co., Ltd., with registered offices at 46, High Street, Omagh, to carry on the business of chemical manufacturers, importers of pharmaceutical preparations, &c.